FIG.1

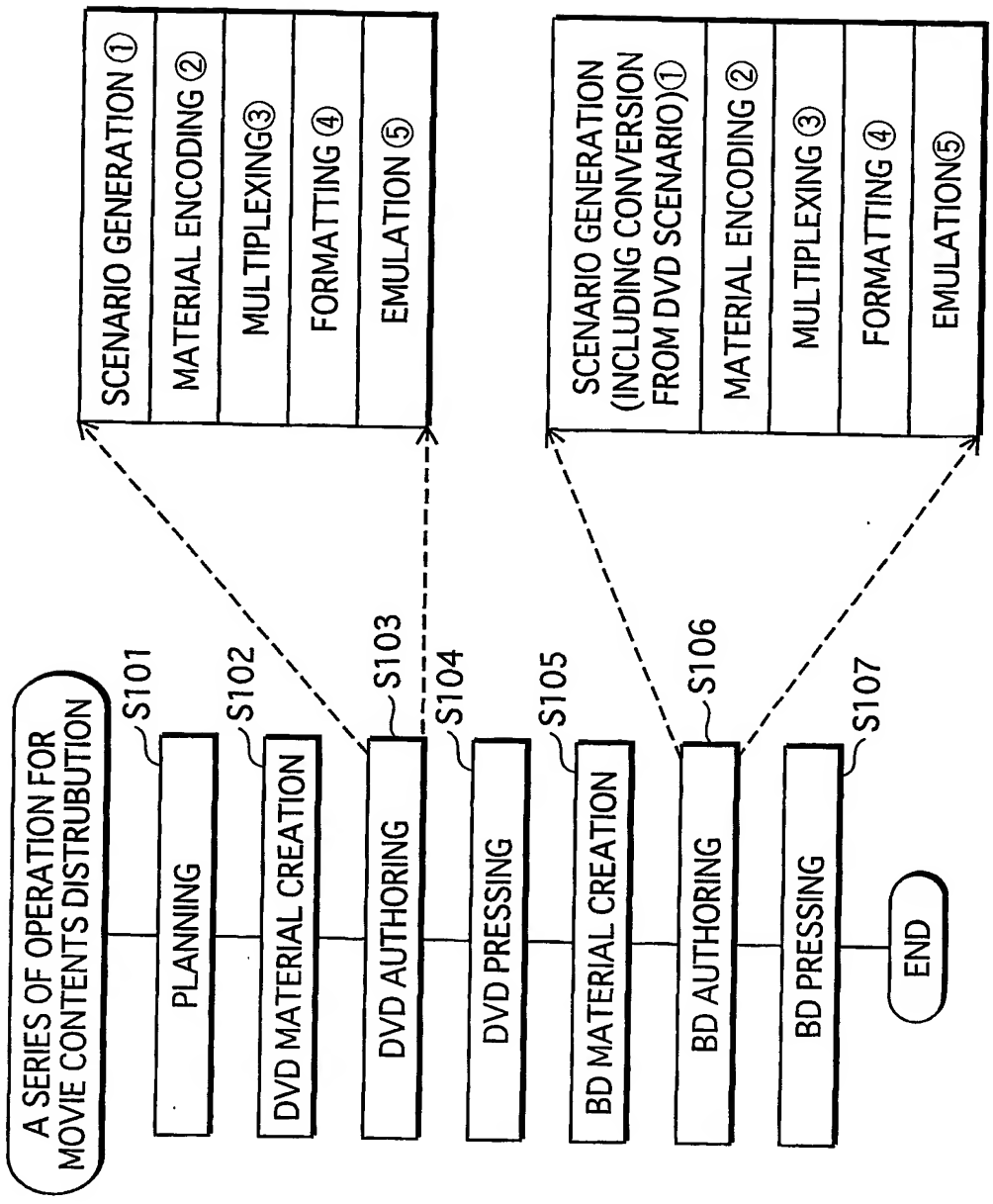

A SERIES OF OPERATION FOR MOVIE CONTENTS DISTRUBUTION
S101
PLANNING
S102
DVD MATERIAL CREATION
S103
DVD AUTHORING
S104
DVD PRESSING
S105
BD MATERIAL CREATION
S106
BD AUTHORING
S107
BD PRESSING
END
SCENARIO GENERATION ①
MATERIAL ENCODING ②
MULTIPLEXING③
FORMATTING ④
EMULATION ⑤
SCENARIO GENERATION (INCLUDING CONVERSION FROM DVD SCENARIO)①
MATERIAL ENCODING ②
MULTIPLEXING ③
FORMATTING ④
EMULATION⑤

FIG.2

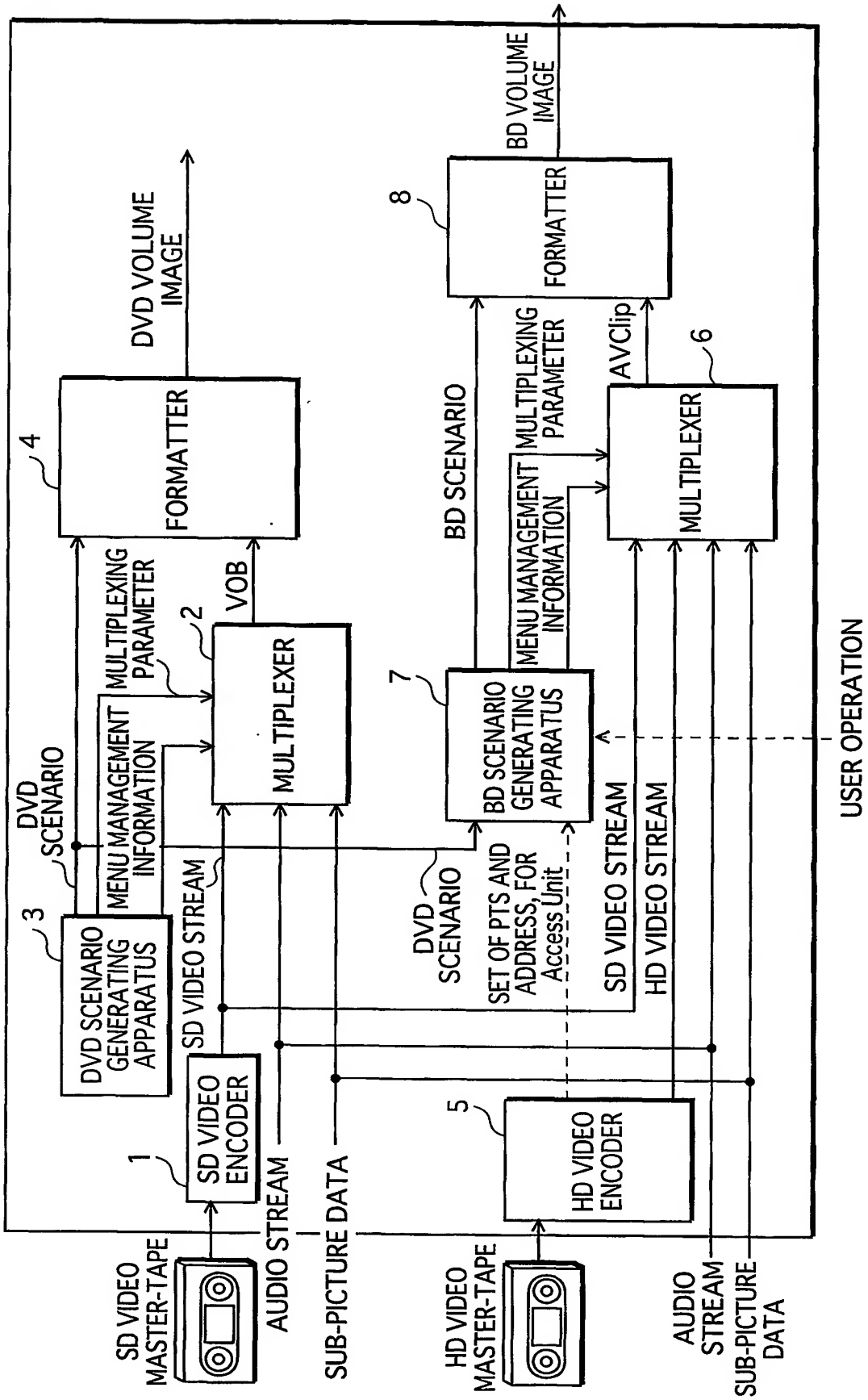

SD VIDEO MASTER-TAPE
AUDIO STREAM
SUB-PICTURE DATA
HD VIDEO MASTER-TAPE
AUDIO STREAM
SUB-PICTURE DATA
1
SD VIDEO ENCODER
5
HD VIDEO ENCODER
3
DVD SCENARIO GENERATING APPARATUS
DVD SCENARIO
MENU MANAGEMENT INFORMATION
MULTIPLEXING PARAMETER
SD VIDEO STREAM
2
MULTIPLEXER
VOB
4
FORMATTER
DVD VOLUME IMAGE
7
BD SCENARIO GENERATING APPARATUS
DVD SCENARIO
SET OF PTS AND ADDRESS, FOR Access Unit
BD SCENARIO
MENU MANAGEMENT INFORMATION
MULTIPLEXING PARAMETER
SD VIDEO STREAM
HD VIDEO STREAM
6
MULTIPLEXER
AVClip
8
FORMATTER
BD VOLUME IMAGE
USER OPERATION

FIG.3

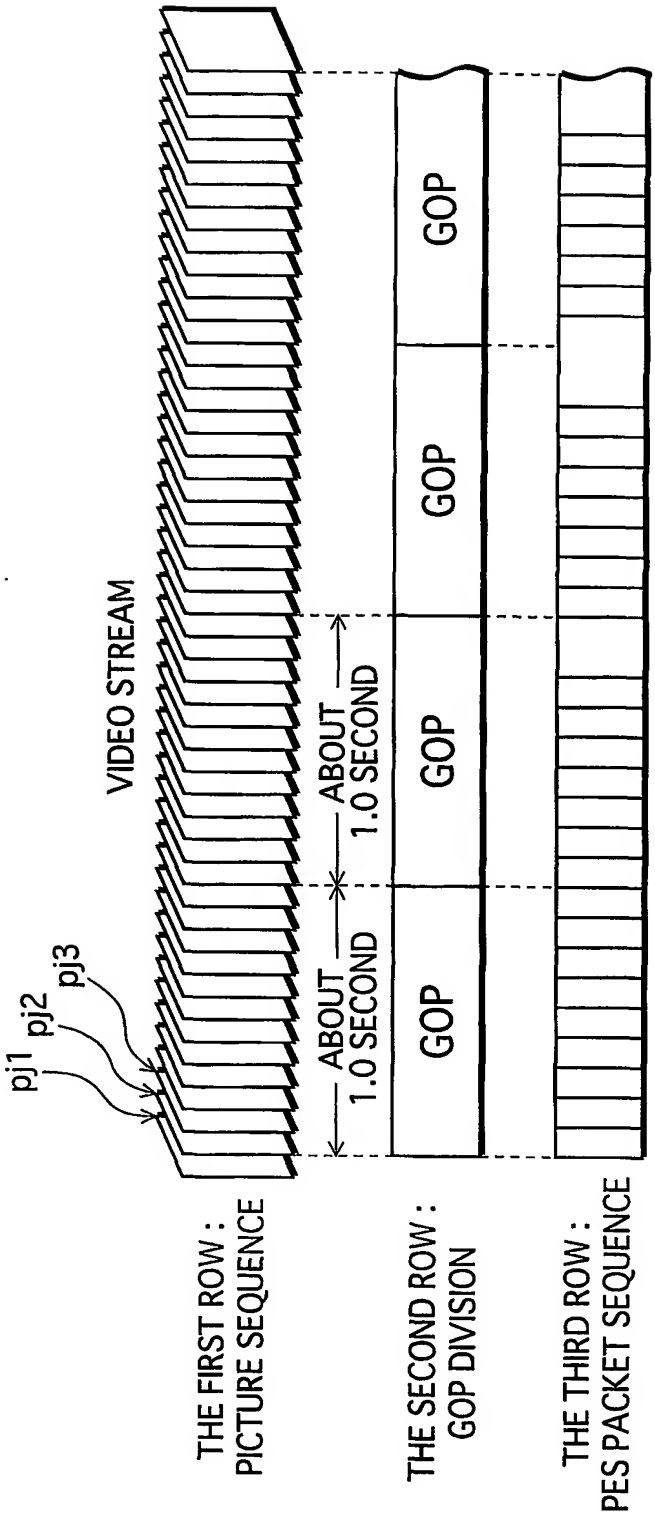

VIDEO STREAM
pj1
pj2
pj3
ABOUT 1.0 SECOND
ABOUT 1.0 SECOND
GOP
GOP
GOP
GOP
THE FIRST ROW : PICTURE SEQUENCE
THE SECOND ROW : GOP DIVISION
THE THIRD ROW : PES PACKET SEQUENCE

FIG.4

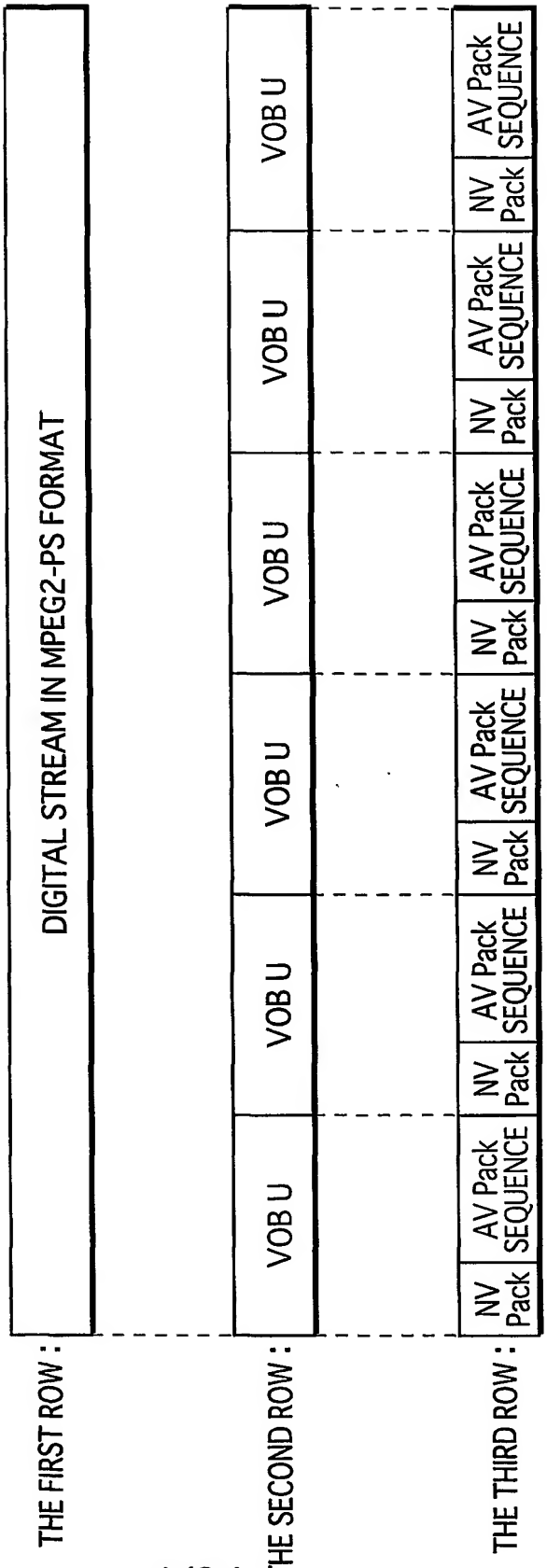

VOB
DIGITAL STREAM IN MPEG2-PS FORMAT
THE FIRST ROW :
THE SECOND ROW :
THE THIRD ROW :
VOB U
NV Pack
AV Pack SEQUENCE

FIG.5

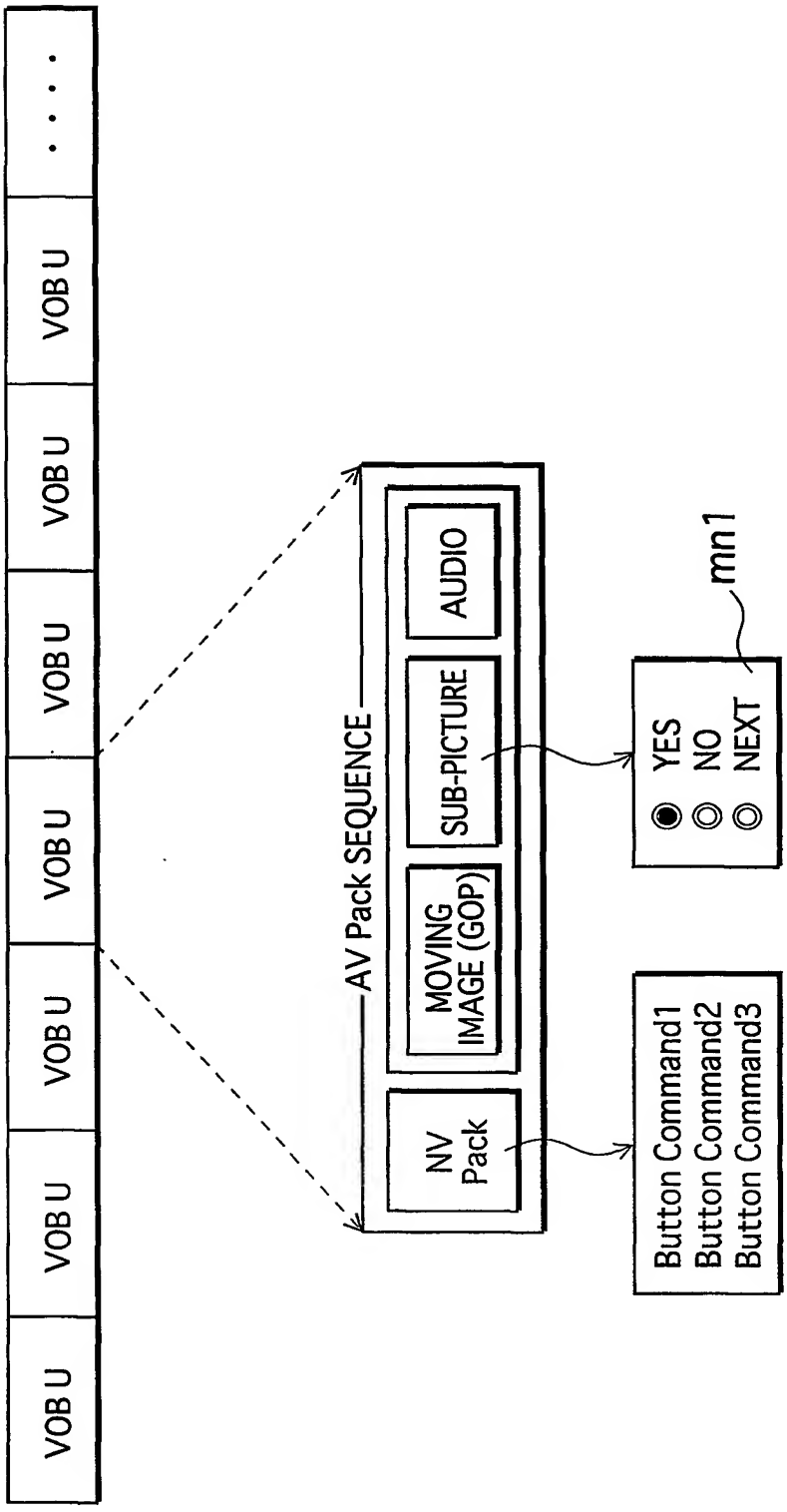

VOB#1
VOB U
VOB U
VOB U
VOB U
VOB U
VOB U
VOB U
. . . .
AV Pack SEQUENCE
NV Pack
MOVING IMAGE (GOP)
SUB-PICTURE
AUDIO
Button Command1
Button Command2
Button Command3
YES
NO
NEXT
mn1

FIG.6

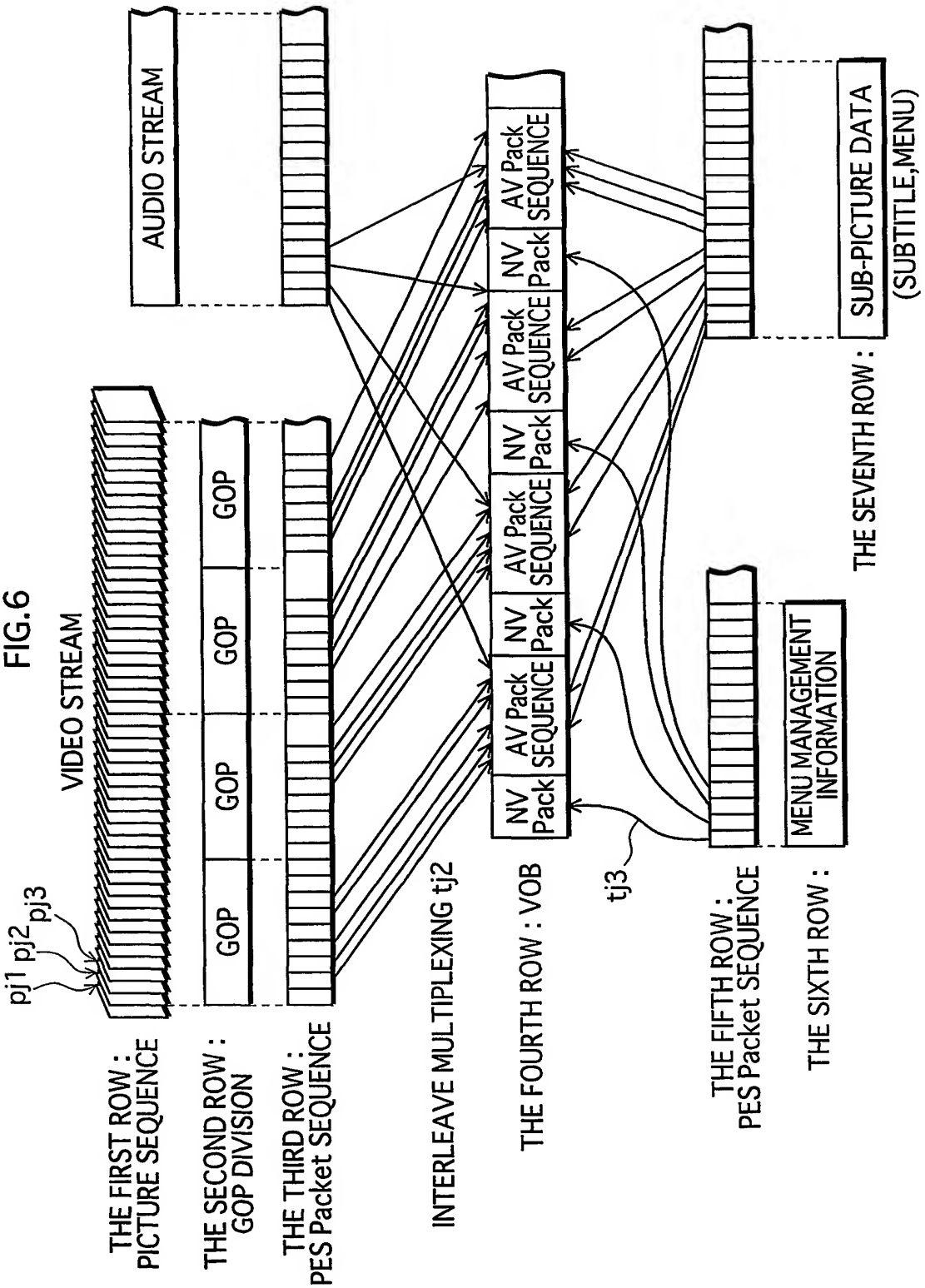

VIDEO STREAM
AUDIO STREAM
pj1 pj2 pj3
GOP
GOP
GOP
GOP
NV Pack
AV Pack SEQUENCE
NV Pack
AV Pack SEQUENCE
NV Pack
AV Pack SEQUENCE
NV Pack
AV Pack SEQUENCE
MENU MANAGEMENT INFORMATION
SUB-PICTURE DATA
(SUBTITLE,MENU)
THE FIRST ROW : PICTURE SEQUENCE
THE SECOND ROW : GOP DIVISION
THE THIRD ROW : PES Packet SEQUENCE
INTERLEAVE MULTIPLEXING tj2
THE FOURTH ROW : VOB
tj3
THE FIFTH ROW : PES Packet SEQUENCE
THE SIXTH ROW :
THE SEVENTH ROW :

FIG.7

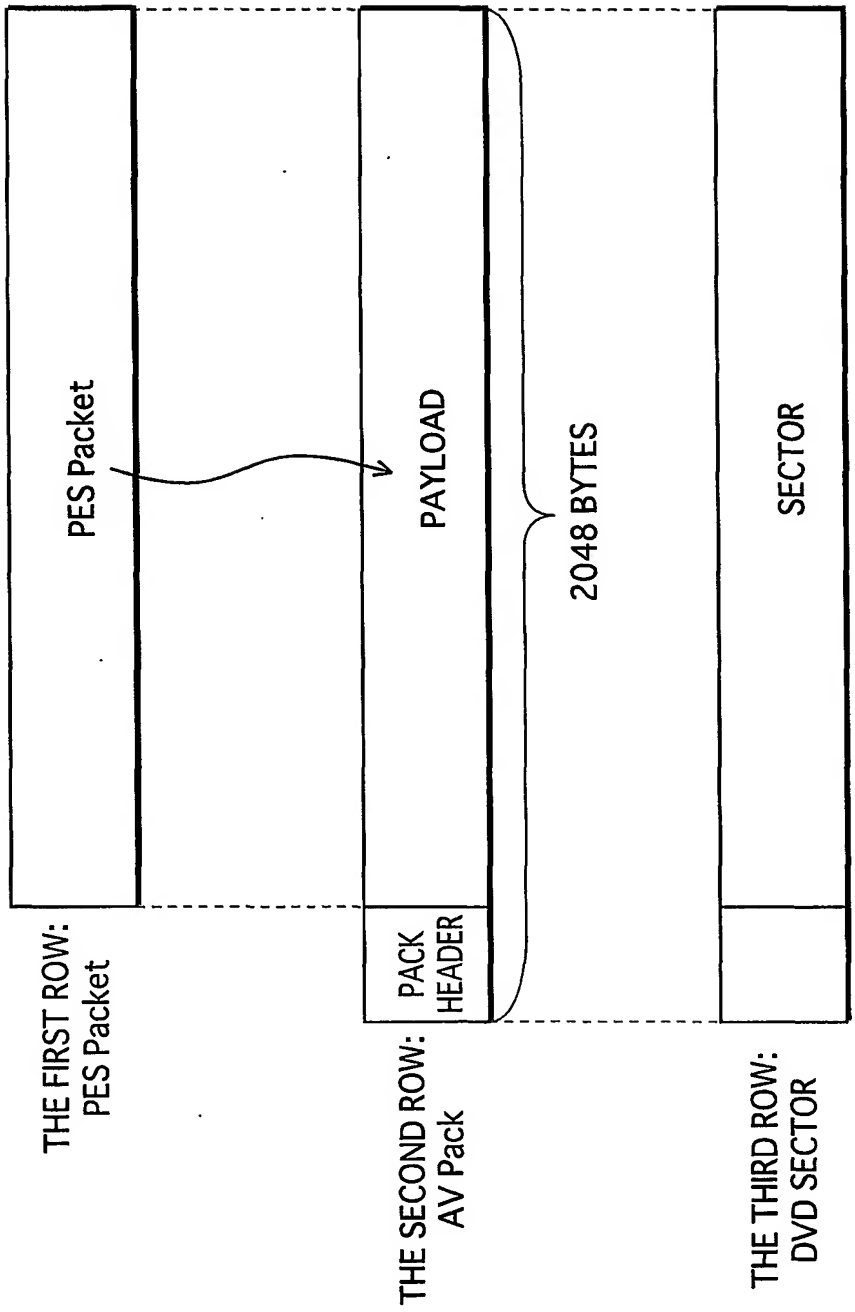

PES Packet
PAYLOAD
2048 BYTES
SECTOR
PACK HEADER
THE FIRST ROW: PES Packet
THE SECOND ROW: AV Pack
THE THIRD ROW: DVD SECTOR

FIG.8

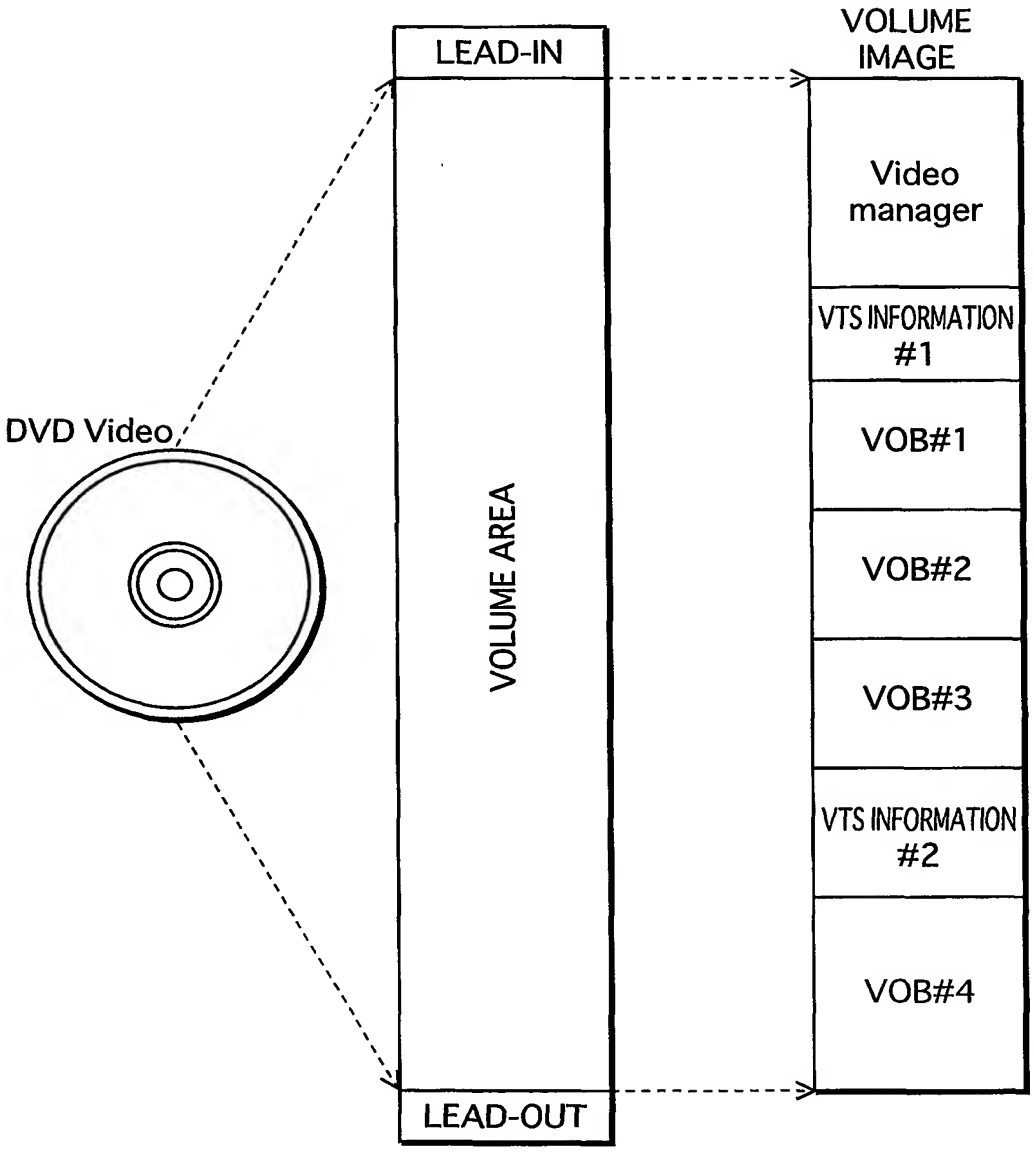
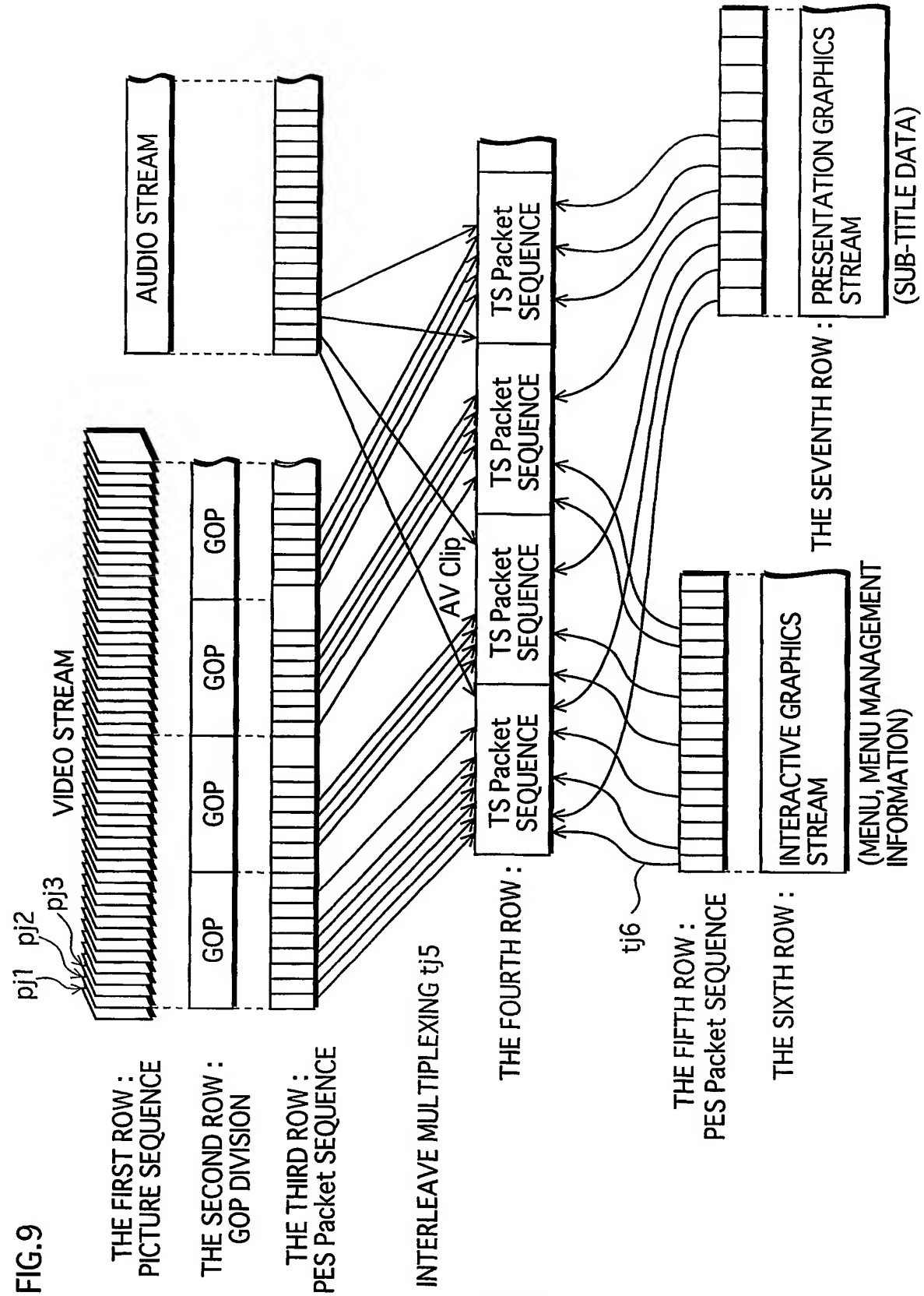

DVD Video
LEAD-IN
VOLUME AREA
LEAD-OUT
VOLUME IMAGE
Video manager
VTS INFORMATION #1
VOB#1
VOB#2
VOB#3
VTS INFORMATION #2
VOB#4

FIG.9


pj1
pj2
pj3
VIDEO STREAM
AUDIO STREAM
GOP
GOP
GOP
GOP
GOP
THE FIRST ROW : PICTURE SEQUENCE
THE SECOND ROW : GOP DIVISION
THE THIRD ROW : PES Packet SEQUENCE
INTERLEAVE MULTIPLEXING tj5
AV Clip
TS Packet SEQUENCE
TS Packet SEQUENCE
TS Packet SEQUENCE
TS Packet SEQUENCE
THE FOURTH ROW :
tj6
THE FIFTH ROW : PES Packet SEQUENCE
INTERACTIVE GRAPHICS STREAM
(MENU, MENU MANAGEMENT INFORMATION)
THE SIXTH ROW :
THE SEVENTH ROW :
PRESENTATION GRAPHICS STREAM
(SUB-TITLE DATA)

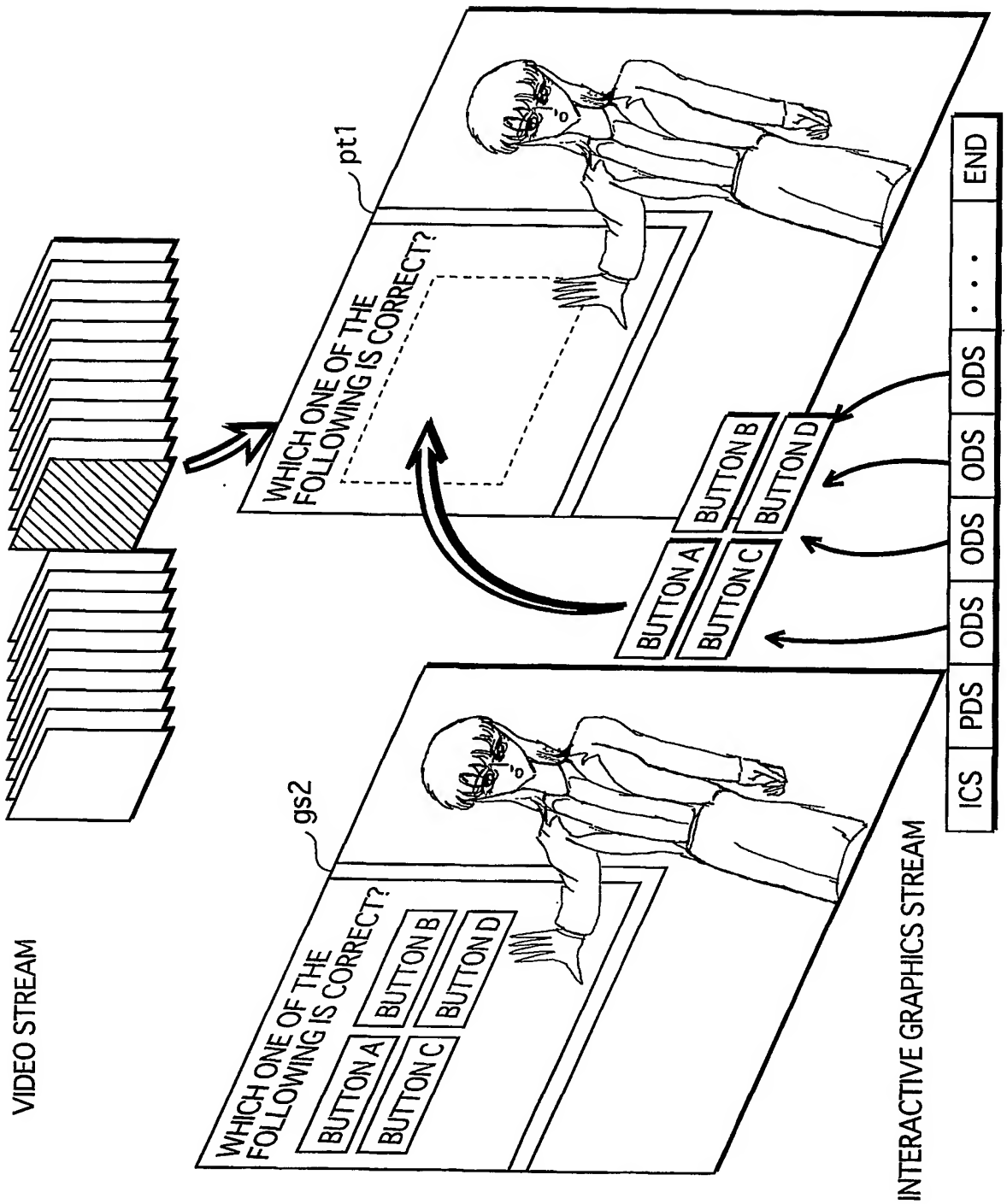

VIDEO STREAM
pt1
WHICH ONE OF THE FOLLOWING IS CORRECT?
BUTTON A
BUTTON B
BUTTON C
BUTTON D
gs2
WHICH ONE OF THE FOLLOWING IS CORRECT?
BUTTON A
BUTTON B
BUTTON C
BUTTON D
INTERACTIVE GRAPHICS STREAM
ICS
PDS
ODS
ODS
ODS
ODS
. . .
END

FIG.10

FIG.11

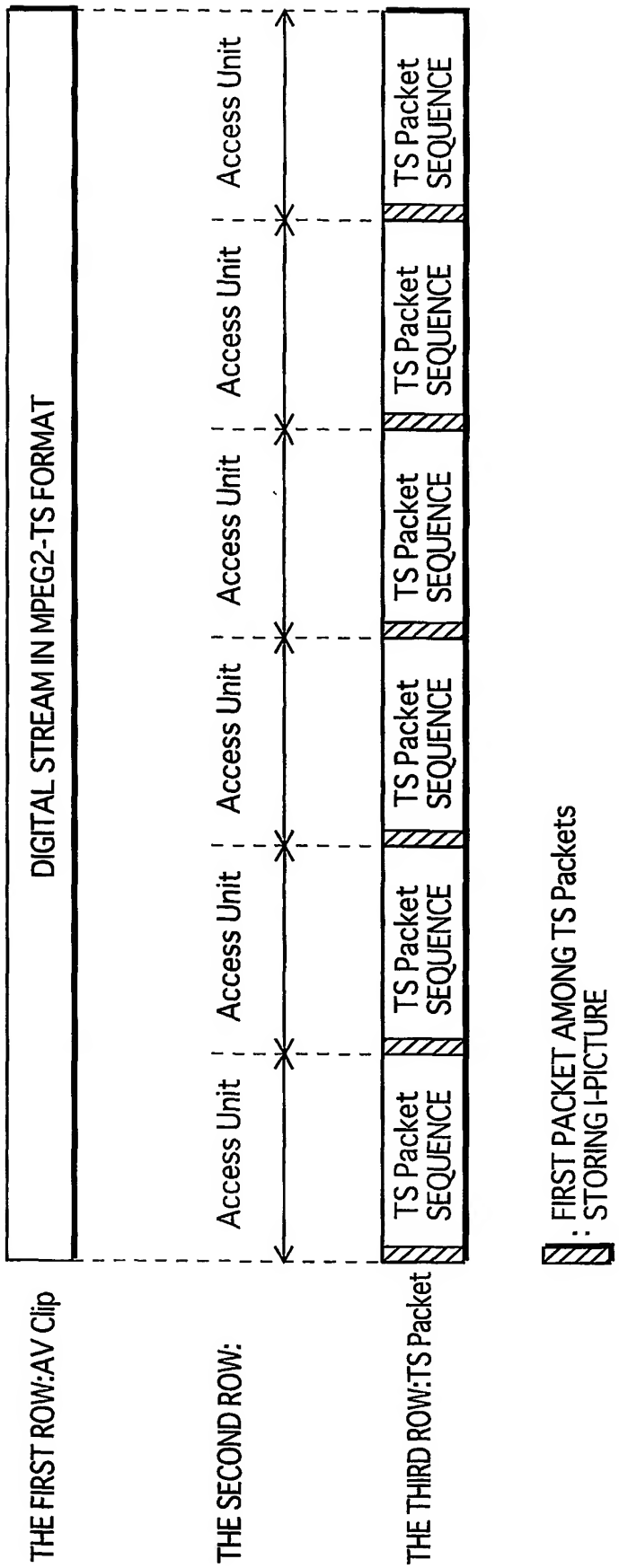

THE FIRST ROW:AV Clip
DIGITAL STREAM IN MPEG2-TS FORMAT
THE SECOND ROW:
Access Unit
Access Unit
Access Unit
Access Unit
Access Unit
THE THIRD ROW:TS Packet
TS Packet SEQUENCE
TS Packet SEQUENCE
TS Packet SEQUENCE
TS Packet SEQUENCE
TS Packet SEQUENCE
: FIRST PACKET AMONG TS Packets : STORING I-PICTURE

FIG.12

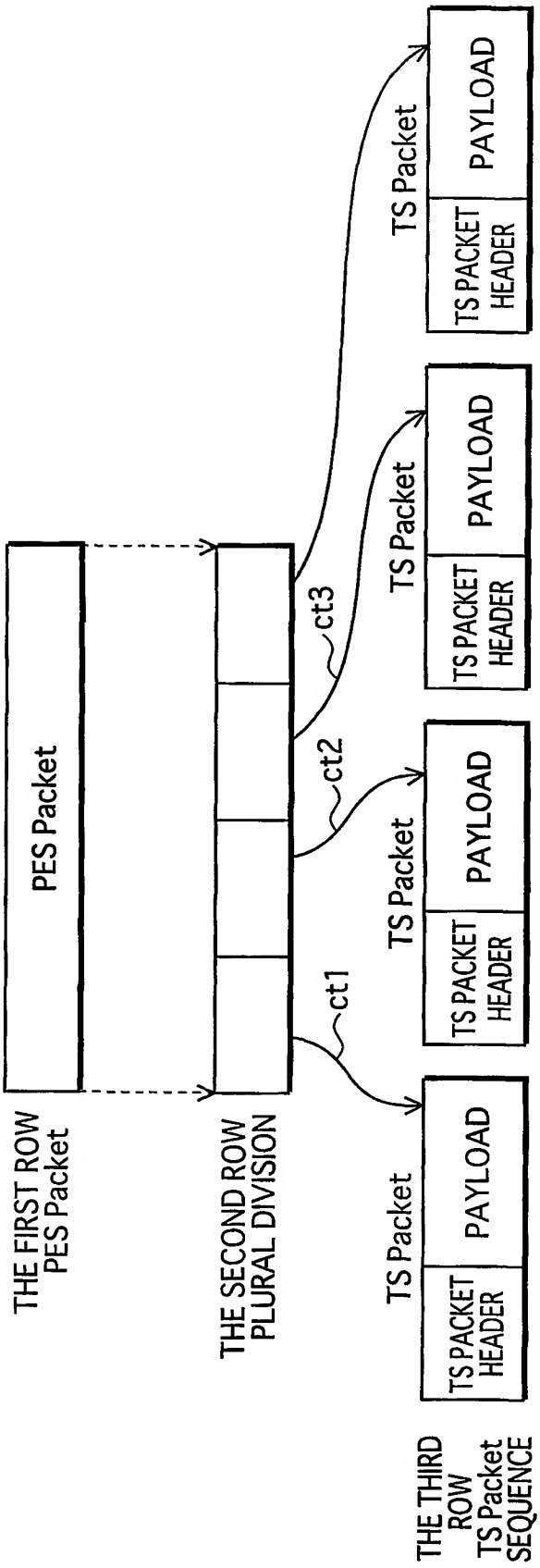

PES Packet
THE FIRST ROW
PES Packet
THE SECOND ROW
PLURAL DIVISION
ct1
ct2
ct3
TS Packet
TS PACKET HEADER
PAYLOAD
THE THIRD ROW
TS Packet SEQUENCE

FIG.13

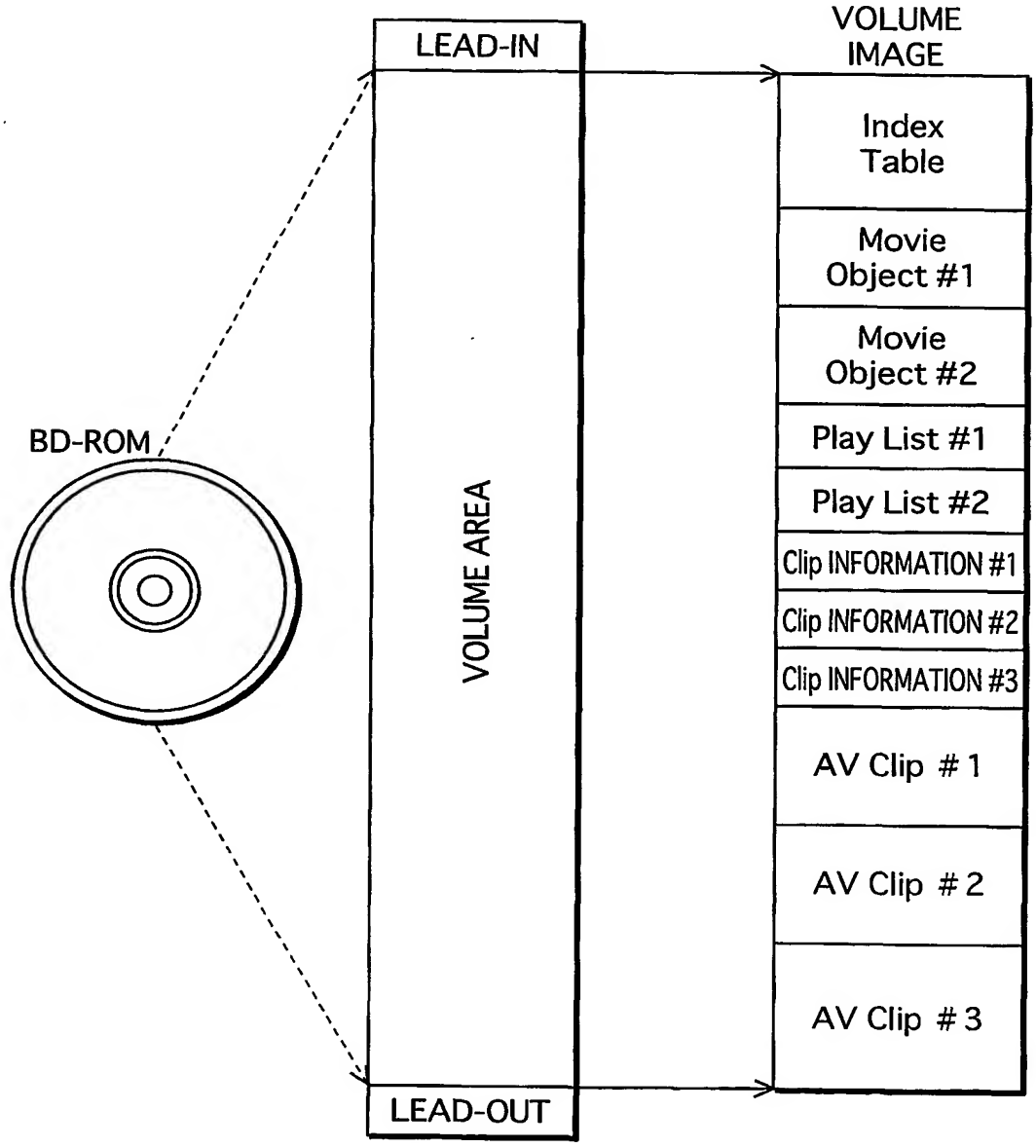

BD-ROM
LEAD-IN
VOLUME AREA
LEAD-OUT
VOLUME IMAGE
Index Table
Movie Object #1
Movie Object #2
Play List #1
Play List #2
Clip INFORMATION #1
Clip INFORMATION #2
Clip INFORMATION #3
AV Clip # 1
AV Clip # 2
AV Clip # 3

FIG.14

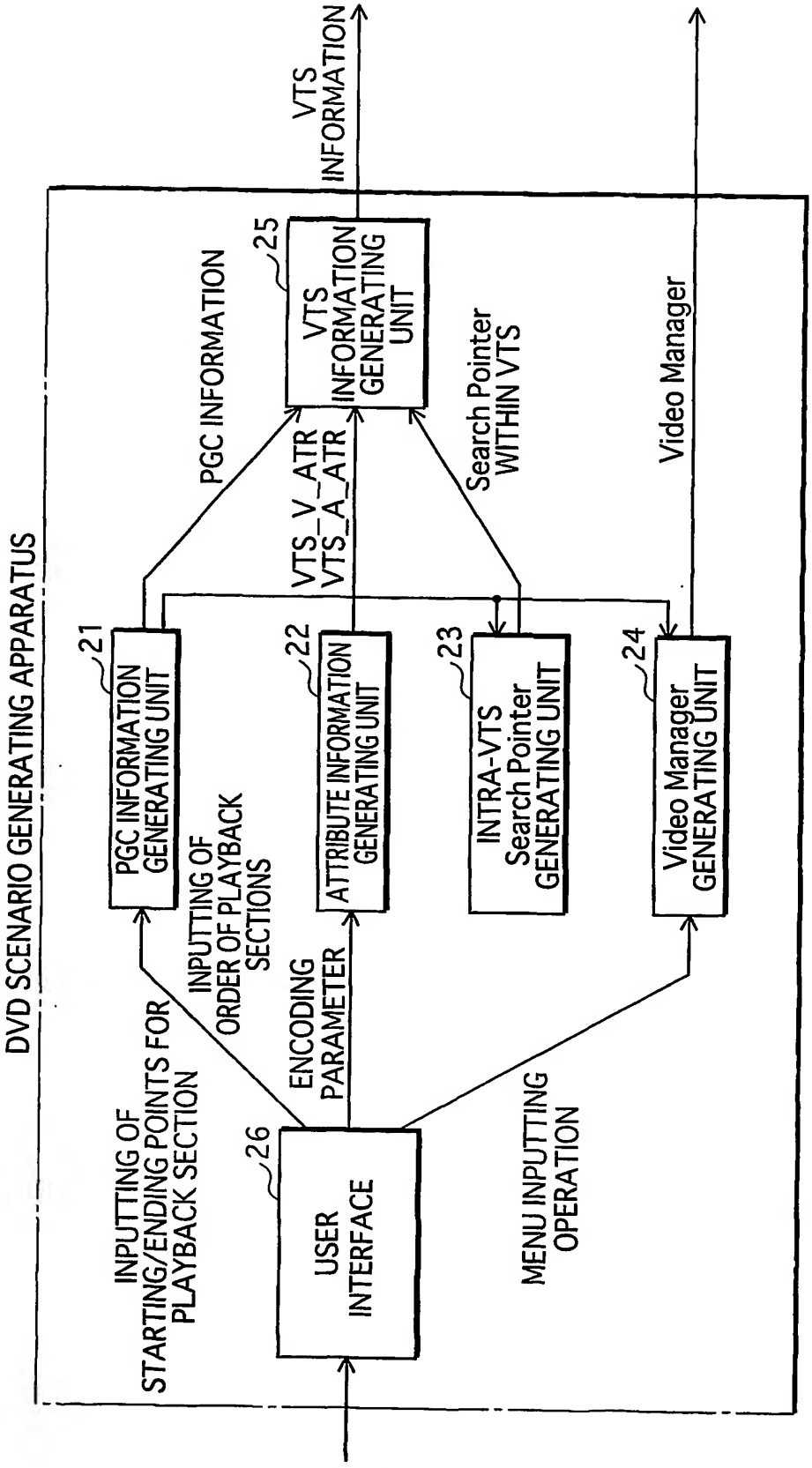

DVD SCENARIO GENERATING APPARATUS
VTS INFORMATION
25
VTS INFORMATION GENERATING UNIT
PGC INFORMATION
VTS_V_ATR
VTS_A_ATR
Search Pointer WITHIN VTS
Video Manager
21
PGC INFORMATION GENERATING UNIT
22
ATTRIBUTE INFORMATION GENERATING UNIT
23
INTRA-VTS Search Pointer GENERATING UNIT
24
Video Manager GENERATING UNIT
INPUTTING OF ORDER OF PLAYBACK SECTIONS
ENCODING PARAMETER
INPUTTING OF STARTING/ENDING POINTS FOR PLAYBACK SECTION
26
USER INTERFACE
MENU INPUTTING OPERATION

FIG.15

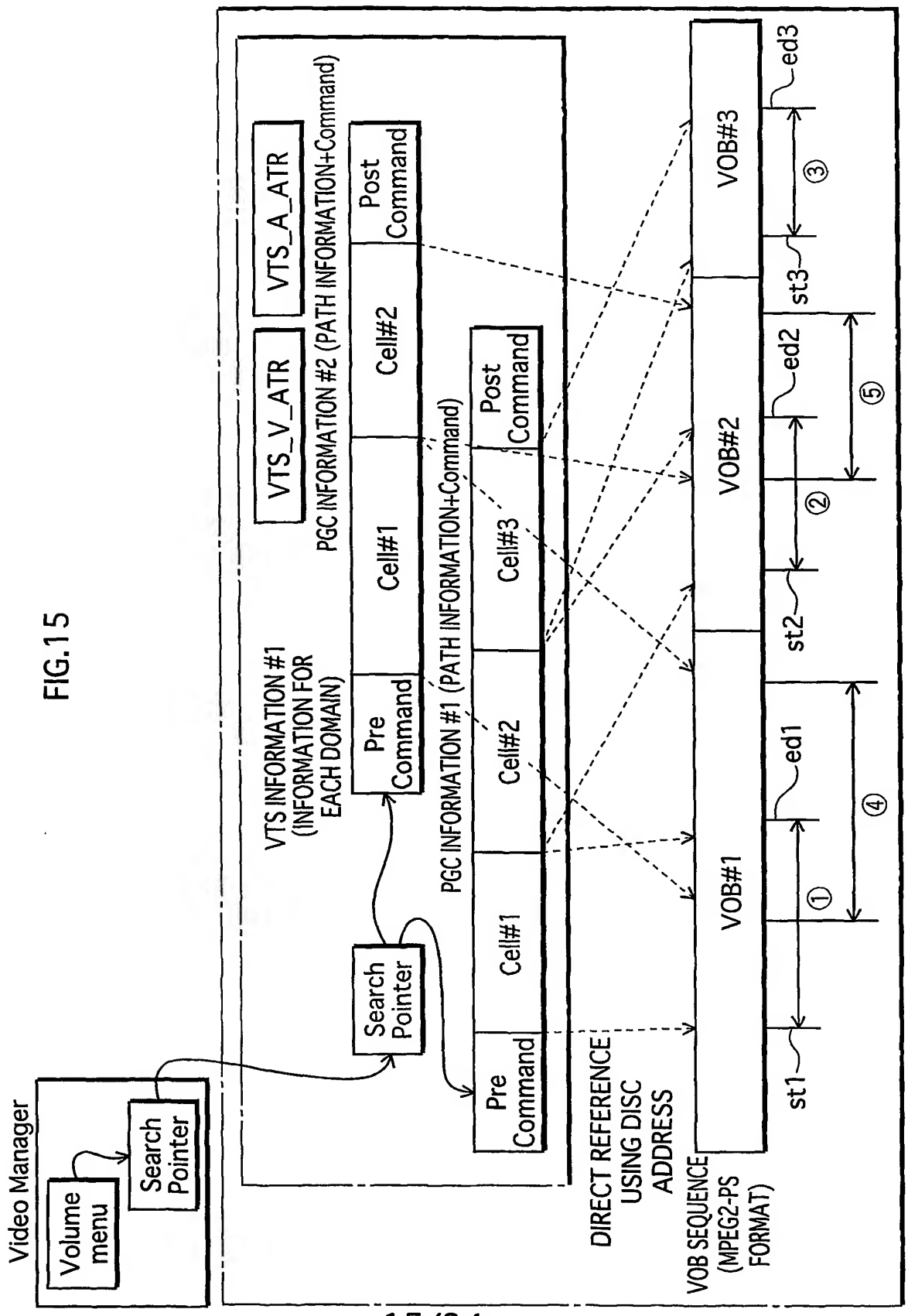

Video Manager
Volume menu
Search Pointer
VTS INFORMATION #1 (INFORMATION FOR EACH DOMAIN)
VTS_V_ATR
VTS_A_ATR
PGC INFORMATION #2 (PATH INFORMATION+Command)
Pre Command
Cell#1
Cell#2
Post Command
Search Pointer
PGC INFORMATION #1 (PATH INFORMATION+Command)
Pre Command
Cell#1
Cell#2
Cell#3
Post Command
DIRECT REFERENCE USING DISC ADDRESS
VOB SEQUENCE (MPEG2-PS FORMAT)
VOB#1
VOB#2
VOB#3
st1
st2
st3
ed1
ed2
ed3
①
②
③
④
⑤

FIG.16

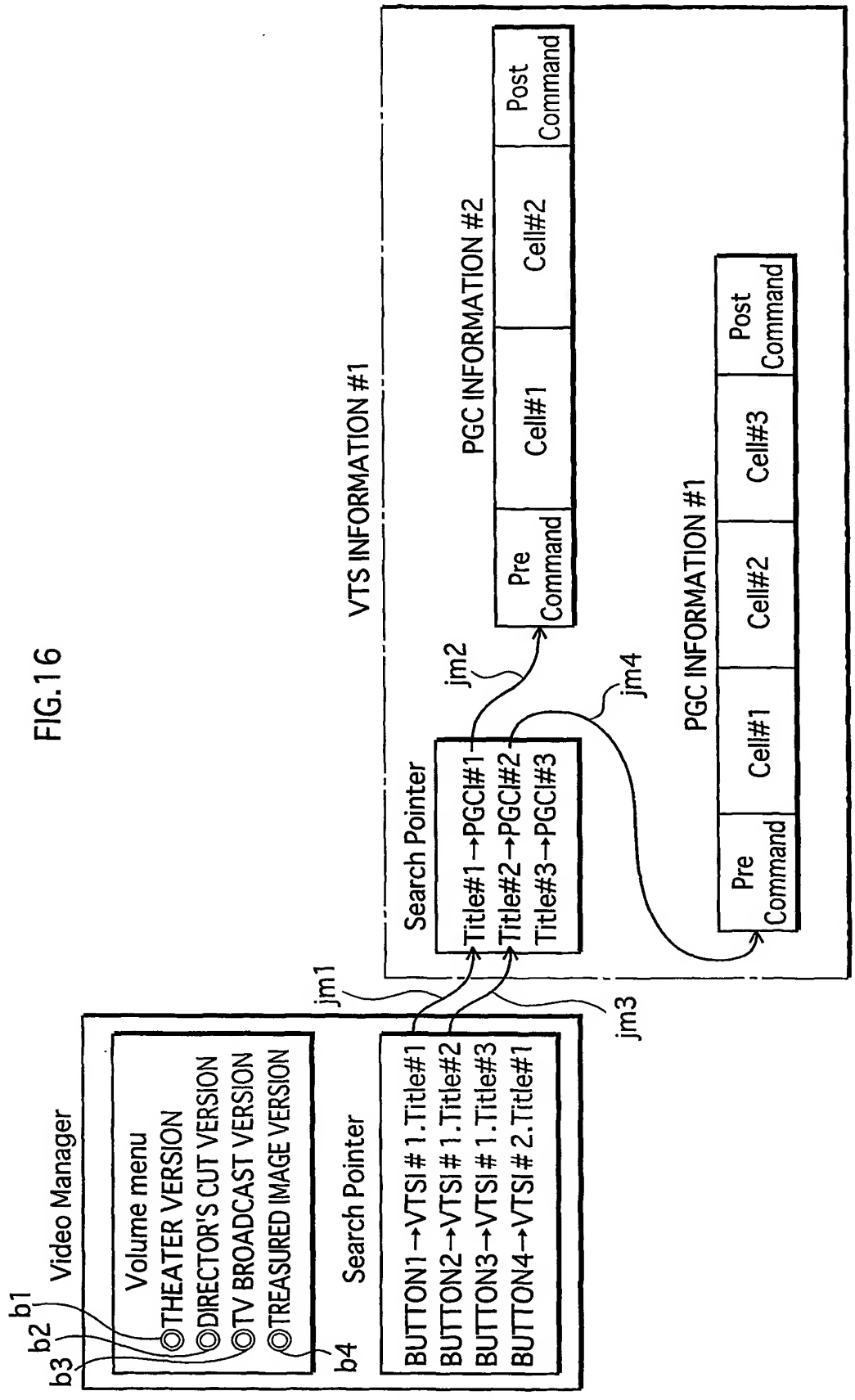

Video Manager
Volume menu
◎THEATER VERSION
◎DIRECTOR'S CUT VERSION
◎TV BROADCAST VERSION
◎TREASURED IMAGE VERSION
Search Pointer
BUTTON1→VTSI#1.Title#1
BUTTON2→VTSI#1.Title#2
BUTTON3→VTSI#1.Title#3
BUTTON4→VTSI#2.Title#1
b1
b2
b3
b4
jm1
jm2
jm3
jm4
VTS INFORMATION #1
Search Pointer
Title#1→PGCI#1
Title#2→PGCI#2
Title#3→PGCI#3
PGC INFORMATION #2
Pre Command
Cell#1
Cell#2
Post Command
PGC INFORMATION #1
Pre Command
Cell#1
Cell#2
Cell#3
Post Command

FIG.17

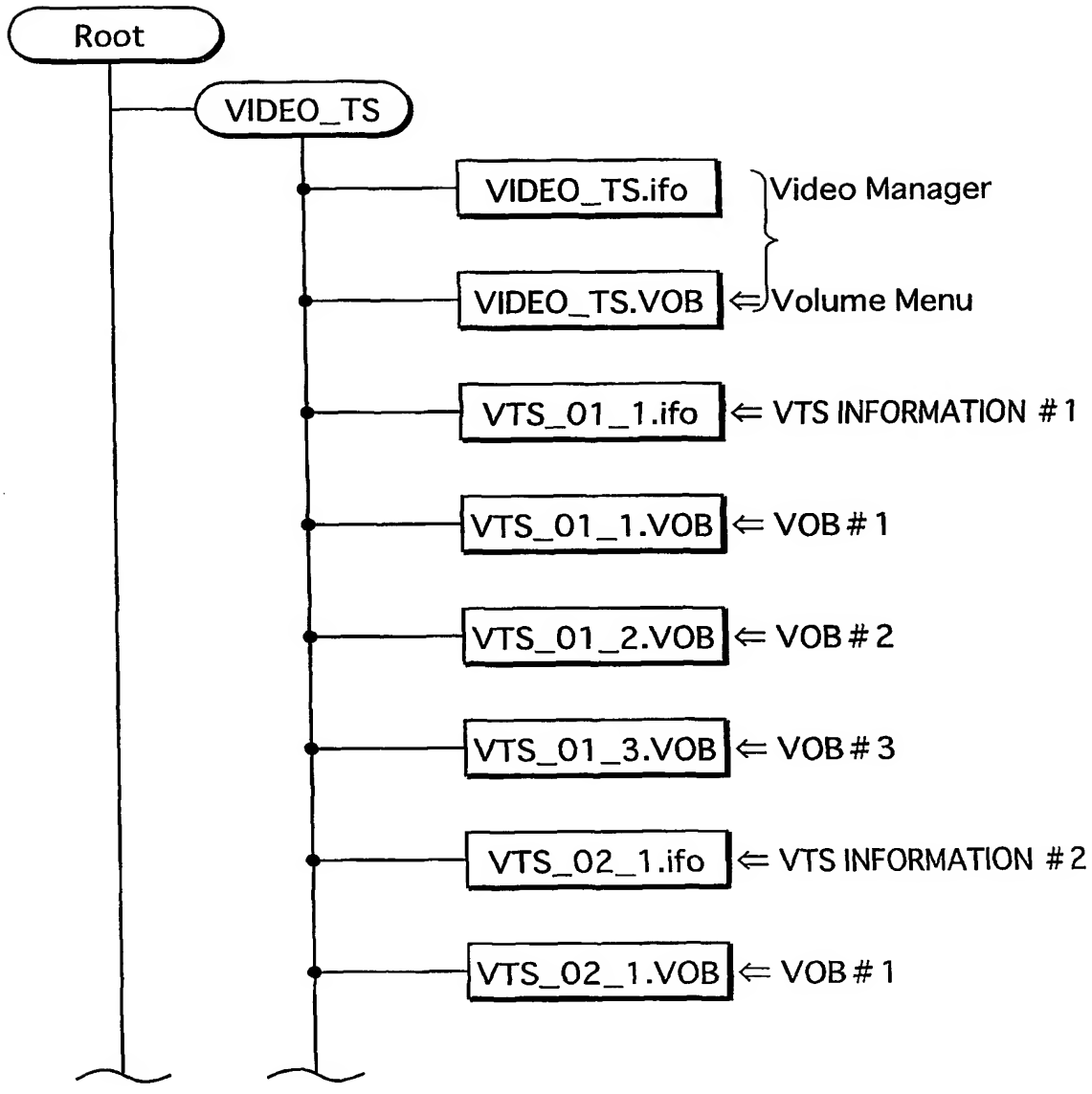

Root
VIDEO_TS
VIDEO_TS.ifo
Video Manager
VIDEO_TS.VOB
⇐Volume Menu
VTS_01_1.ifo
⇐ VTS INFORMATION #1
VTS_01_1.VOB
⇐ VOB#1
VTS_01_2.VOB
⇐ VOB#2
VTS_01_3.VOB
⇐ VOB#3
VTS_02_1.ifo
⇐ VTS INFORMATION #2
VTS_02_1.VOB
⇐ VOB#1

FIG.18

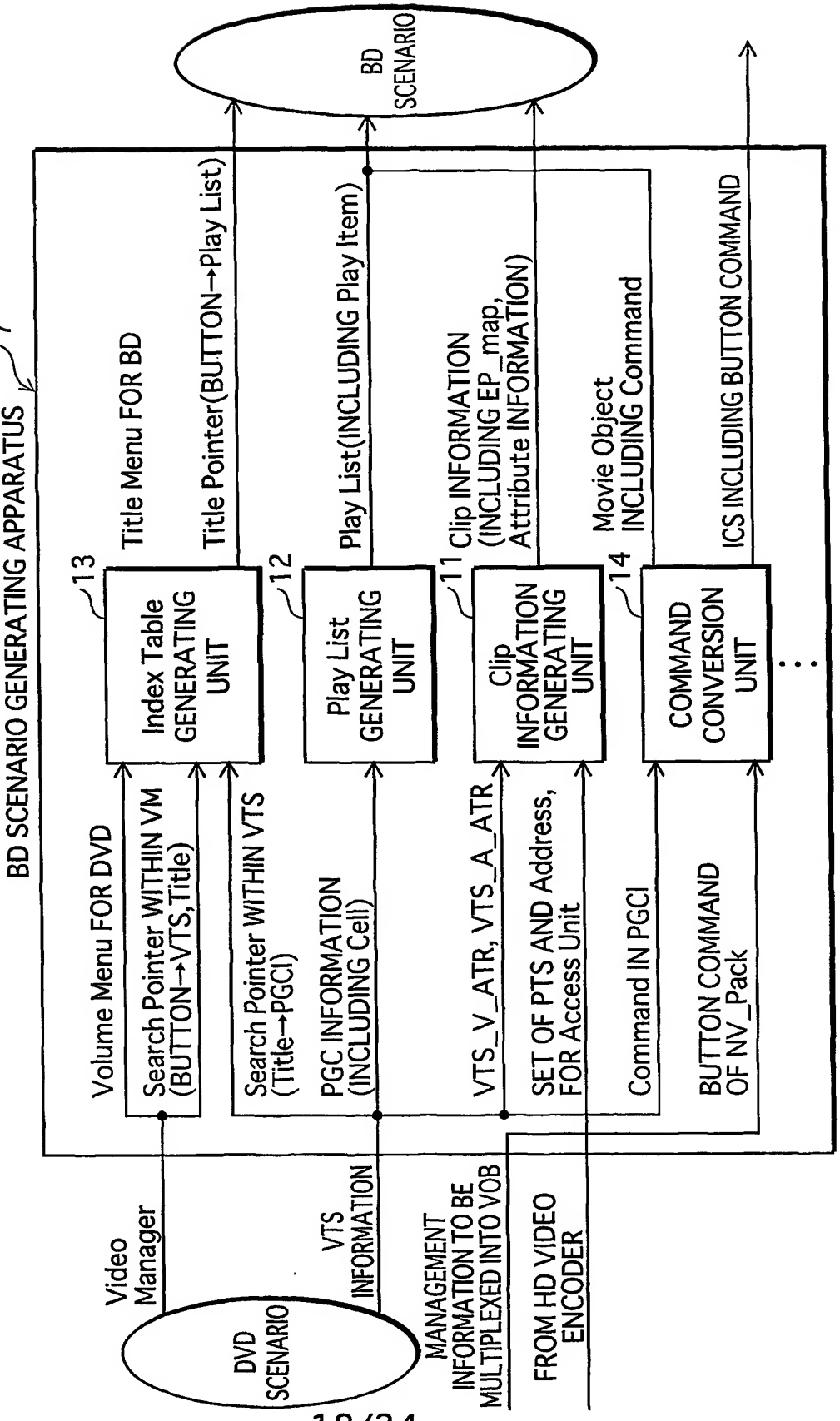

BD SCENARIO GENERATING APPARATUS
7
BD SCENARIO
Index Table GENERATING UNIT
13
Play List GENERATING UNIT
12
Clip INFORMATION GENERATING UNIT
11
COMMAND CONVERSION UNIT
14
Title Menu FOR BD
Title Pointer(BUTTON→Play List)
Play List(INCLUDING Play Item)
Clip INFORMATION (INCLUDING EP_map, Attribute INFORMATION)
Movie Object INCLUDING Command
ICS INCLUDING BUTTON COMMAND
Volume Menu FOR DVD
Search Pointer WITHIN VM (BUTTON→VTS,Title)
Search Pointer WITHIN VTS (Title→PGCI)
PGC INFORMATION (INCLUDING Cell)
VTS_V_ATR, VTS_A_ATR
SET OF PTS AND Address, FOR Access Unit
Command IN PGCI
BUTTON COMMAND OF NV_Pack
Video Manager
VTS INFORMATION
DVD SCENARIO
MANAGEMENT INFORMATION TO BE MULTIPLEXED INTO VOB
FROM HD VIDEO ENCODER

FIG. 19

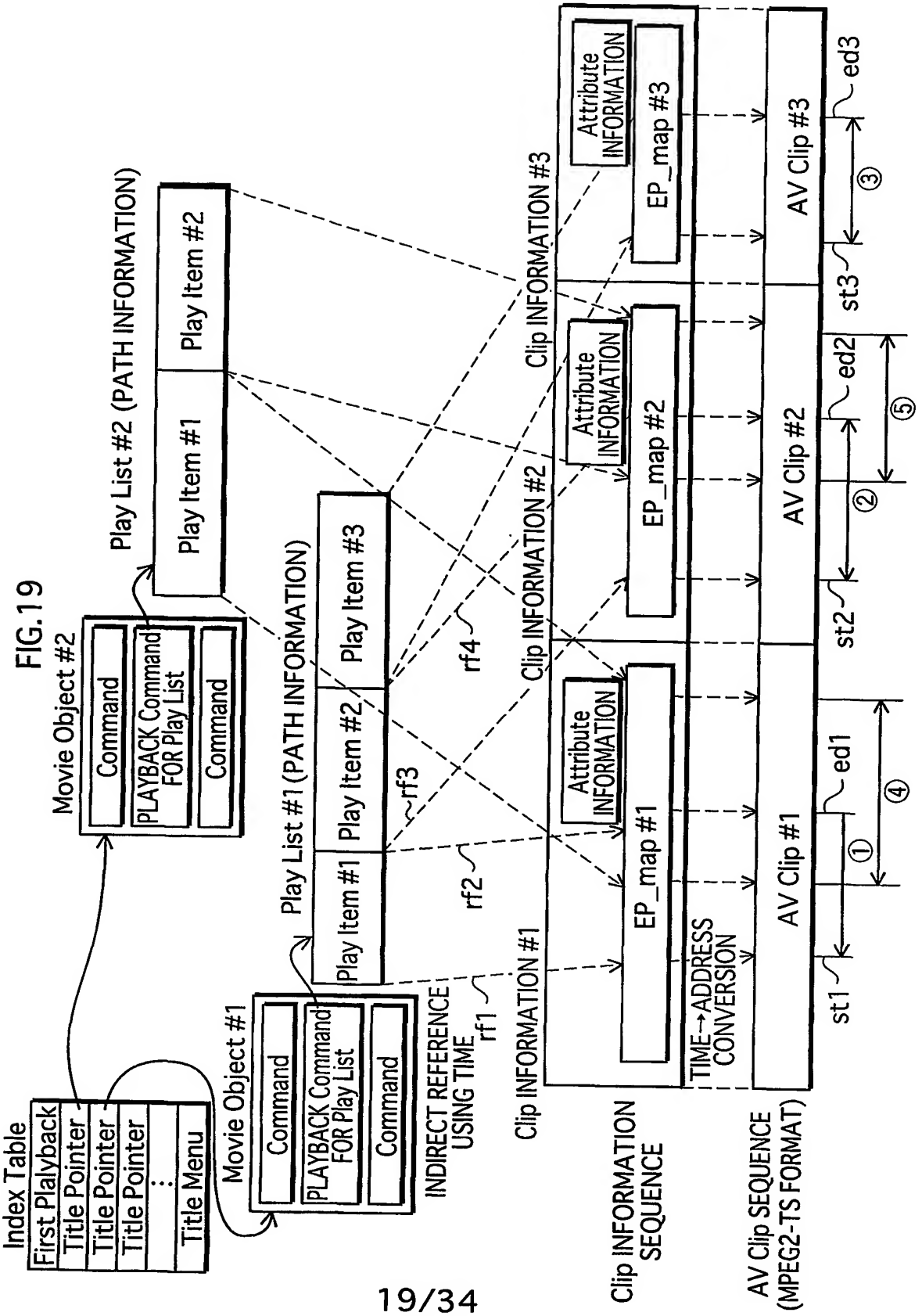

Index Table
First Playback
Title Pointer
Title Pointer
Title Pointer
Title Menu
Movie Object #1
Command
PLAYBACK Command FOR Play List
Command
Movie Object #2
Command
PLAYBACK Command FOR Play List
Command
Play List #1 (PATH INFORMATION)
Play Item #1
Play Item #2
Play Item #3
Play List #2 (PATH INFORMATION)
Play Item #1
Play Item #2
INDIRECT REFERENCE USING TIME
rf1
rf2
rf3
rf4
Clip INFORMATION #1
Clip INFORMATION #2
Clip INFORMATION #3
Attribute INFORMATION
EP_map #1
EP_map #2
EP_map #3
TIME→ADDRESS CONVERSION
Clip INFORMATION SEQUENCE
AV Clip #1
AV Clip #2
AV Clip #3
AV Clip SEQUENCE (MPEG2-TS FORMAT)
st1
st2
st3
ed1
ed2
ed3
①
②
③
④
⑤

FIG.20

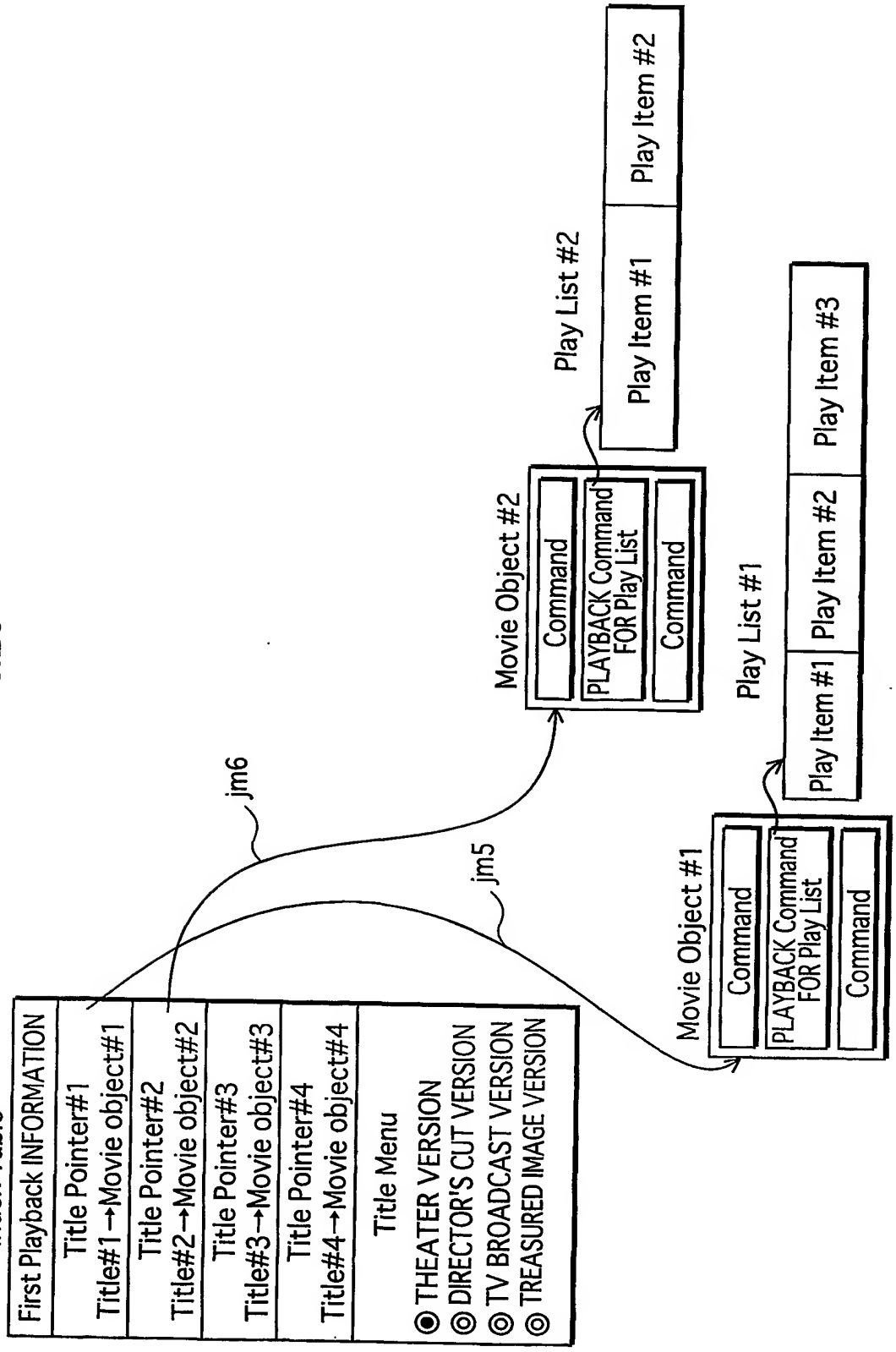

Index Table
First Playback INFORMATION
Title Pointer#1
Title#1→Movie object#1
Title Pointer#2
Title#2→Movie object#2
Title Pointer#3
Title#3→Movie object#3
Title Pointer#4
Title#4→Movie object#4
Title Menu
◉ THEATER VERSION
◎ DIRECTOR'S CUT VERSION
◎ TV BROADCAST VERSION
◎ TREASURED IMAGE VERSION
jm6
jm5
Movie Object #2
Command
PLAYBACK Command FOR Play List
Command
Play List #2
Play Item #1
Play Item #2
Movie Object #1
Command
PLAYBACK Command FOR Play List
Command
Play List #1
Play Item #1
Play Item #2
Play Item #3

FIG.21

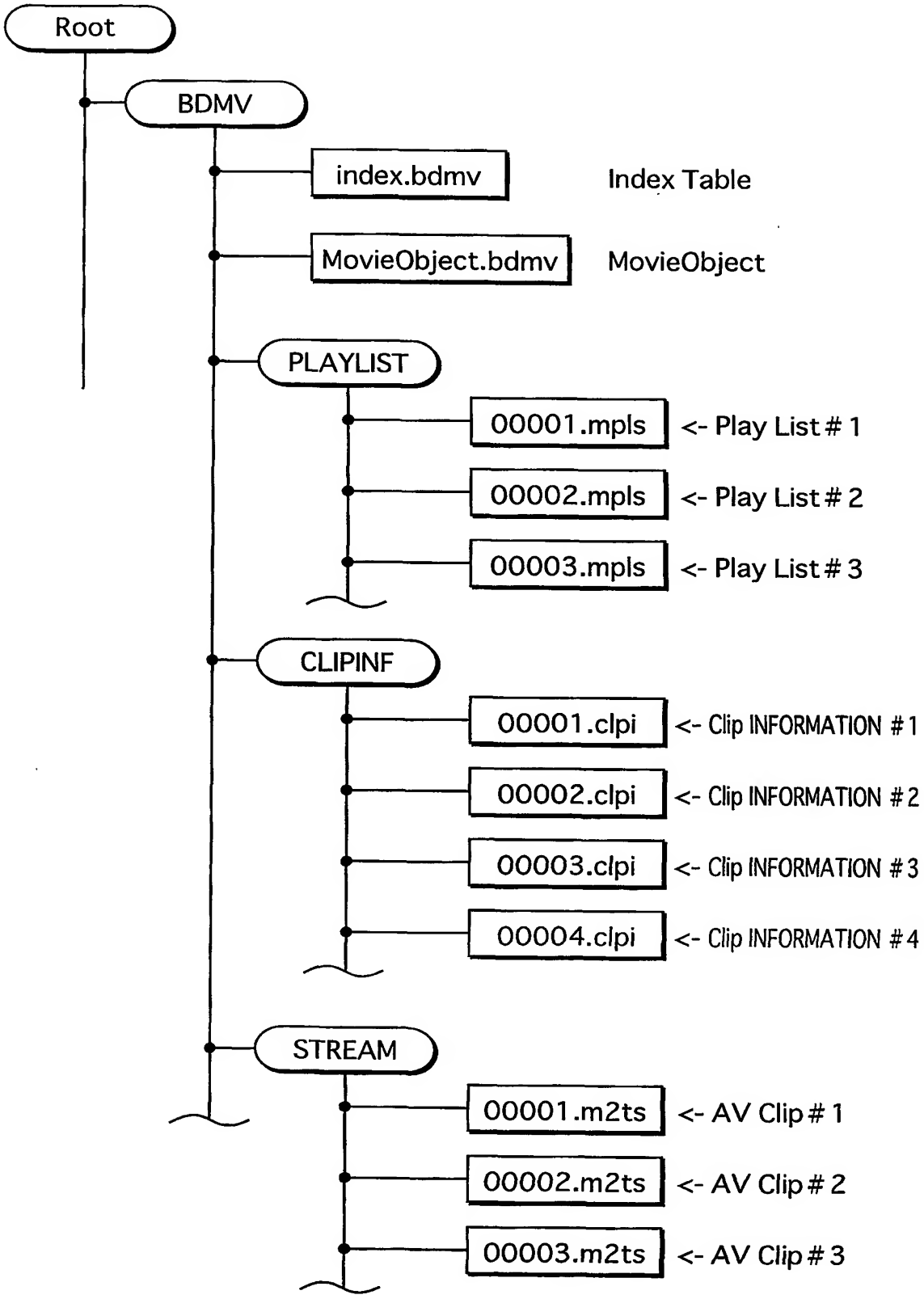

Root
BDMV
index.bdmv
Index Table
MovieObject.bdmv
MovieObject
PLAYLIST
00001.mpls
<- Play List # 1
00002.mpls
<- Play List # 2
00003.mpls
<- Play List # 3
CLIPINF
00001.clpi
<- Clip INFORMATION # 1
00002.clpi
<- Clip INFORMATION # 2
00003.clpi
<- Clip INFORMATION # 3
00004.clpi
<- Clip INFORMATION # 4
STREAM
00001.m2ts
<- AV Clip # 1
00002.m2ts
<- AV Clip # 2
00003.m2ts
<- AV Clip # 3

FIG.22

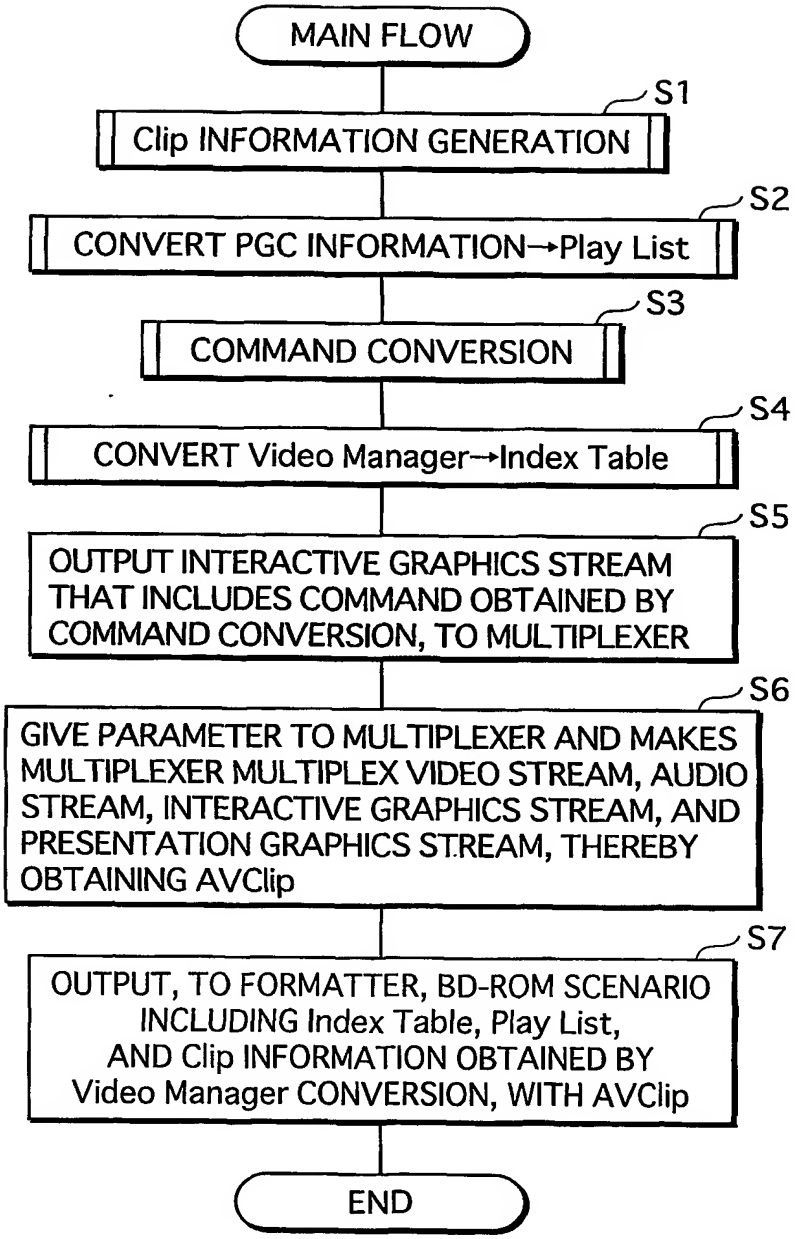

MAIN FLOW
S1
Clip INFORMATION GENERATION
S2
CONVERT PGC INFORMATION→Play List
S3
COMMAND CONVERSION
S4
CONVERT Video Manager→Index Table
S5
OUTPUT INTERACTIVE GRAPHICS STREAM THAT INCLUDES COMMAND OBTAINED BY COMMAND CONVERSION, TO MULTIPLEXER
S6
GIVE PARAMETER TO MULTIPLEXER AND MAKES MULTIPLEXER MULTIPLEX VIDEO STREAM, AUDIO STREAM, INTERACTIVE GRAPHICS STREAM, AND PRESENTATION GRAPHICS STREAM, THEREBY OBTAINING AVClip
S7
OUTPUT, TO FORMATTER, BD-ROM SCENARIO INCLUDING Index Table, Play List, AND Clip INFORMATION OBTAINED BY Video Manager CONVERSION, WITH AVClip
END

FIG.23

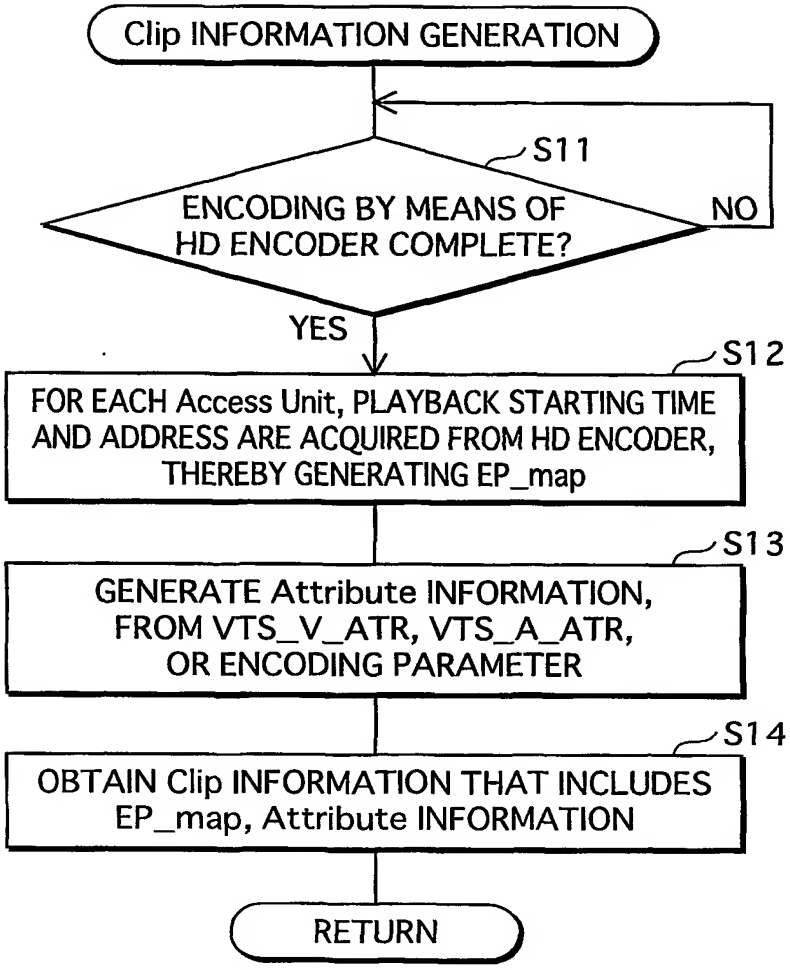

Clip INFORMATION GENERATION
S11
ENCODING BY MEANS OF HD ENCODER COMPLETE?
NO
YES
S12
FOR EACH Access Unit, PLAYBACK STARTING TIME AND ADDRESS ARE ACQUIRED FROM HD ENCODER, THEREBY GENERATING EP_map
S13
GENERATE Attribute INFORMATION, FROM VTS_V_ATR, VTS_A_ATR, OR ENCODING PARAMETER
S14
OBTAIN Clip INFORMATION THAT INCLUDES EP_map, Attribute INFORMATION
RETURN

FIG.24

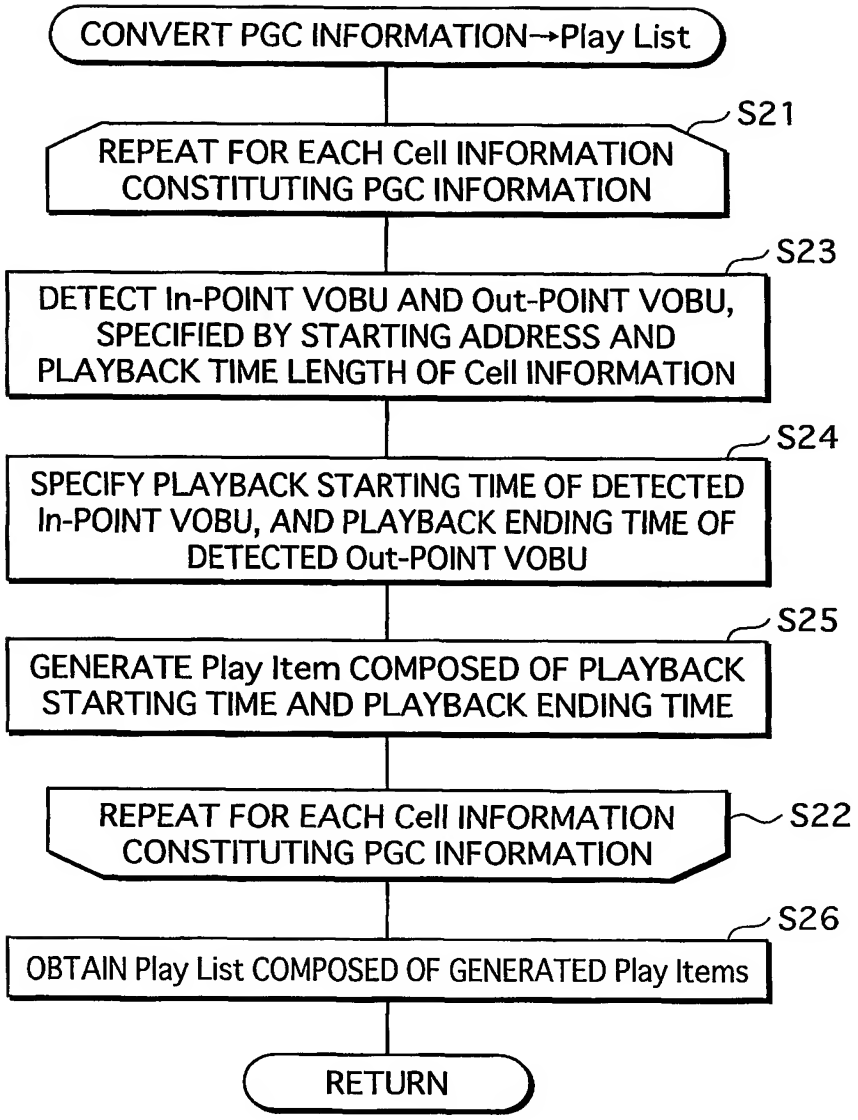

CONVERT PGC INFORMATION→Play List
S21
REPEAT FOR EACH Cell INFORMATION CONSTITUTING PGC INFORMATION
S23
DETECT In-POINT VOBU AND Out-POINT VOBU, SPECIFIED BY STARTING ADDRESS AND PLAYBACK TIME LENGTH OF Cell INFORMATION
S24
SPECIFY PLAYBACK STARTING TIME OF DETECTED In-POINT VOBU, AND PLAYBACK ENDING TIME OF DETECTED Out-POINT VOBU
S25
GENERATE Play Item COMPOSED OF PLAYBACK STARTING TIME AND PLAYBACK ENDING TIME
REPEAT FOR EACH Cell INFORMATION CONSTITUTING PGC INFORMATION
S22
S26
OBTAIN Play List COMPOSED OF GENERATED Play Items
RETURN

FIG.25

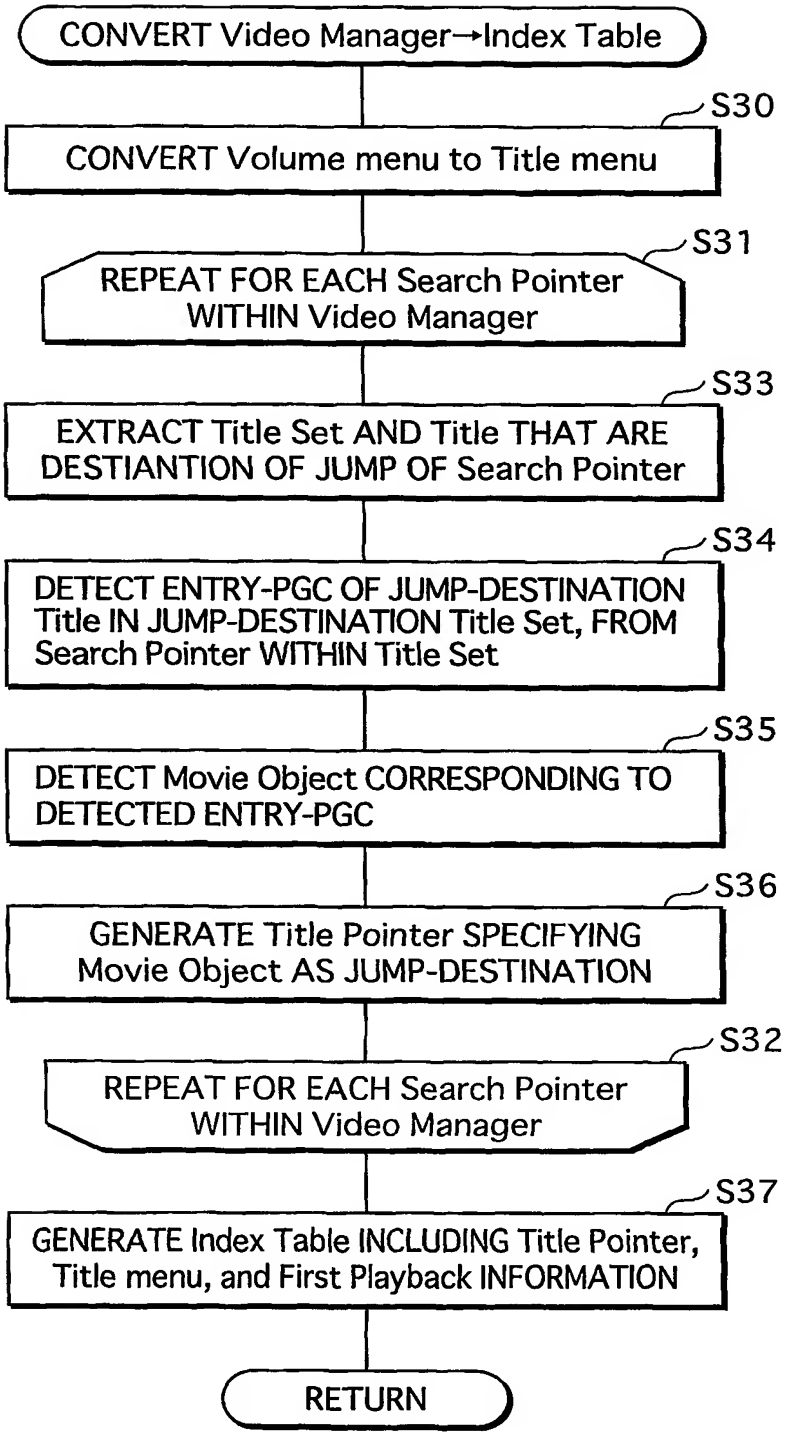
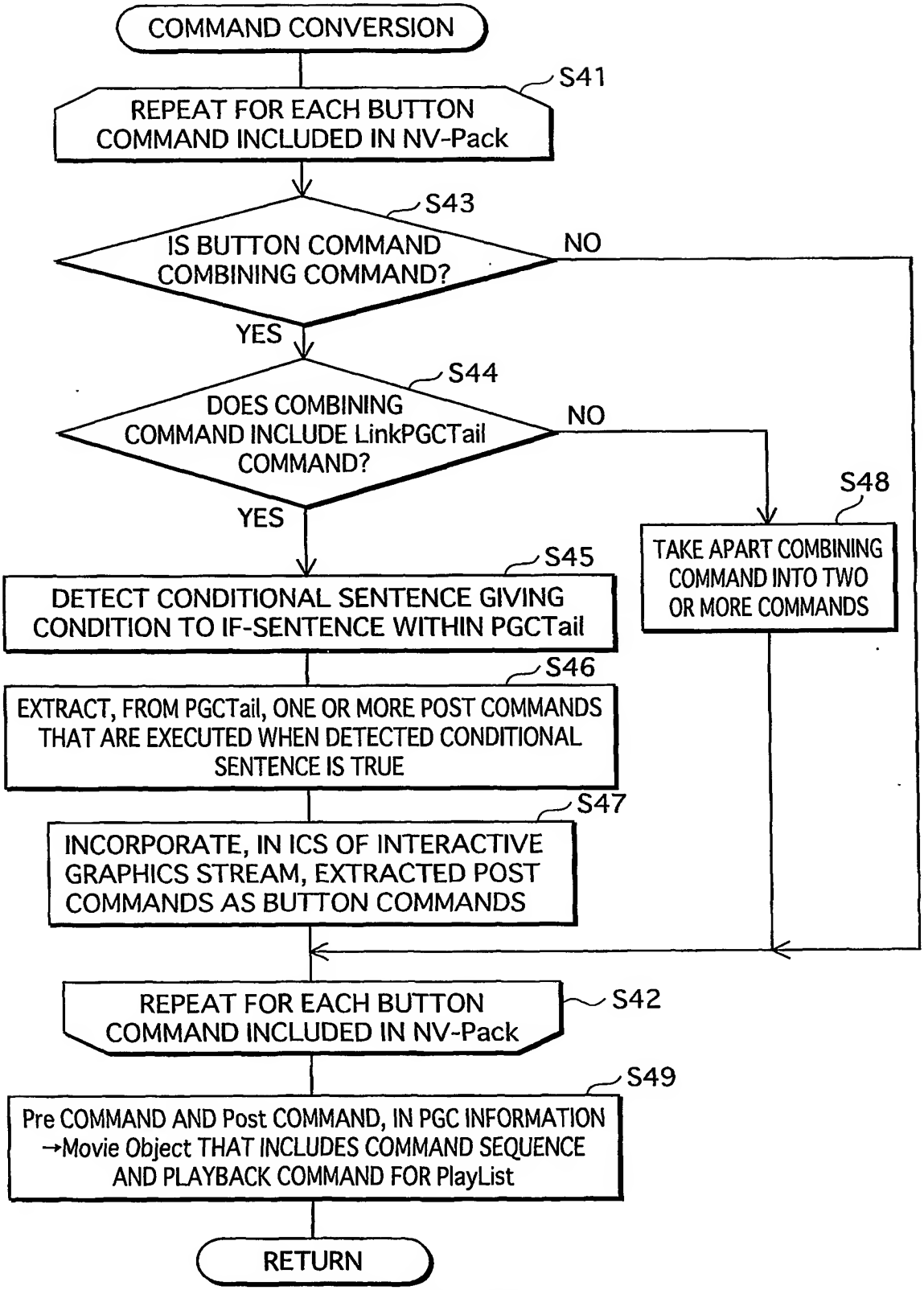

CONVERT Video Manager→Index Table
S30
CONVERT Volume menu to Title menu
S31
REPEAT FOR EACH Search Pointer WITHIN Video Manager
S33
EXTRACT Title Set AND Title THAT ARE DESTIANTION OF JUMP OF Search Pointer
S34
DETECT ENTRY-PGC OF JUMP-DESTINATION Title IN JUMP-DESTINATION Title Set, FROM Search Pointer WITHIN Title Set
S35
DETECT Movie Object CORRESPONDING TO DETECTED ENTRY-PGC
S36
GENERATE Title Pointer SPECIFYING Movie Object AS JUMP-DESTINATION
S32
REPEAT FOR EACH Search Pointer WITHIN Video Manager
S37
GENERATE Index Table INCLUDING Title Pointer, Title menu, and First Playback INFORMATION
RETURN

FIG.26


COMMAND CONVERSION
S41
REPEAT FOR EACH BUTTON COMMAND INCLUDED IN NV-Pack
S43
IS BUTTON COMMAND COMBINING COMMAND?
NO
YES
S44
DOES COMBINING COMMAND INCLUDE LinkPGCTail COMMAND?
NO
YES
S48
TAKE APART COMBINING COMMAND INTO TWO OR MORE COMMANDS
S45
DETECT CONDITIONAL SENTENCE GIVING CONDITION TO IF-SENTENCE WITHIN PGCTail
S46
EXTRACT, FROM PGCTail, ONE OR MORE POST COMMANDS THAT ARE EXECUTED WHEN DETECTED CONDITIONAL SENTENCE IS TRUE
S47
INCORPORATE, IN ICS OF INTERACTIVE GRAPHICS STREAM, EXTRACTED POST COMMANDS AS BUTTON COMMANDS
REPEAT FOR EACH BUTTON COMMAND INCLUDED IN NV-Pack
S42
S49
Pre COMMAND AND Post COMMAND, IN PGC INFORMATION →Movie Object THAT INCLUDES COMMAND SEQUENCE AND PLAYBACK COMMAND FOR PlayList
RETURN

A

EXAMPLE PROGRAM IN DVD-Video

FIG.27

```
BUTTON1
   GP0 = 1 & Link PGC Tail        : SET VALUE FOR GPO, AND MOVE TO PGC Tail (EXECUTE Post COMMAND)
BUTTON2
   GP0 = 2 & Link PGC Tail        : MOVE TO PGC Tail
BUTTON3
   GP0 = 3 & Link PGC Tail        : MOVE TO PGC Tail
```

B

```
PGC Tail
   01 if(GP0! = 1)goto 05         : IF GPO IS "1", EXECUTE FROM "02"
   02    Audio Stream = 1         : SELECT AUDIO STREAM
   03    Highlighted Button = 2   : AFTER RETURNING, MAKE SURE NEXT BUTTON IS SELECTED
   04    Jump Title10             : JUMP TO TITLE 10

   05 if(GP0! = 2)goto 09         : WHEN GPO IS "2", EXECUTE FROM "06"
   06    Audio Stream = 1
   07    Highlighted Button = 3
   08    Jump Title11
   09 Audio Stream = 2
   10 Highlighted Button = 1
   11 Jump Title11
```

FIG.28

```
BUTTON1
   Audio Stream = 1              : SELECT AUDIO STREAM
   Highlighted Button = 2        : AFTER RETURNING, MAKE SURE NEXT BUTTON IS SELECTED
   Jump Title10                  : JUMP TO TITLE 10

BUTTON2
   Audio Stream = 1              : SELECT AUDIO STREAM
   Highlighted Button = 3        : AFTER RETURNING, MAKE SURE NEXT BUTTON IS SELECTED
   Jump Title11                  : JUMP TO TITLE 11

BUTTON1
   Audio Stream = 2              : SELECT AUDIO STREAM
   Highlighted Button = 1        : AFTER RETURNING, MAKE SURE NEXT BUTTON IS SELECTED
   Jump Title11                  : JUMP TO TITLE 11(WITH DIFFERENT AUDIO)
```

FIG.29

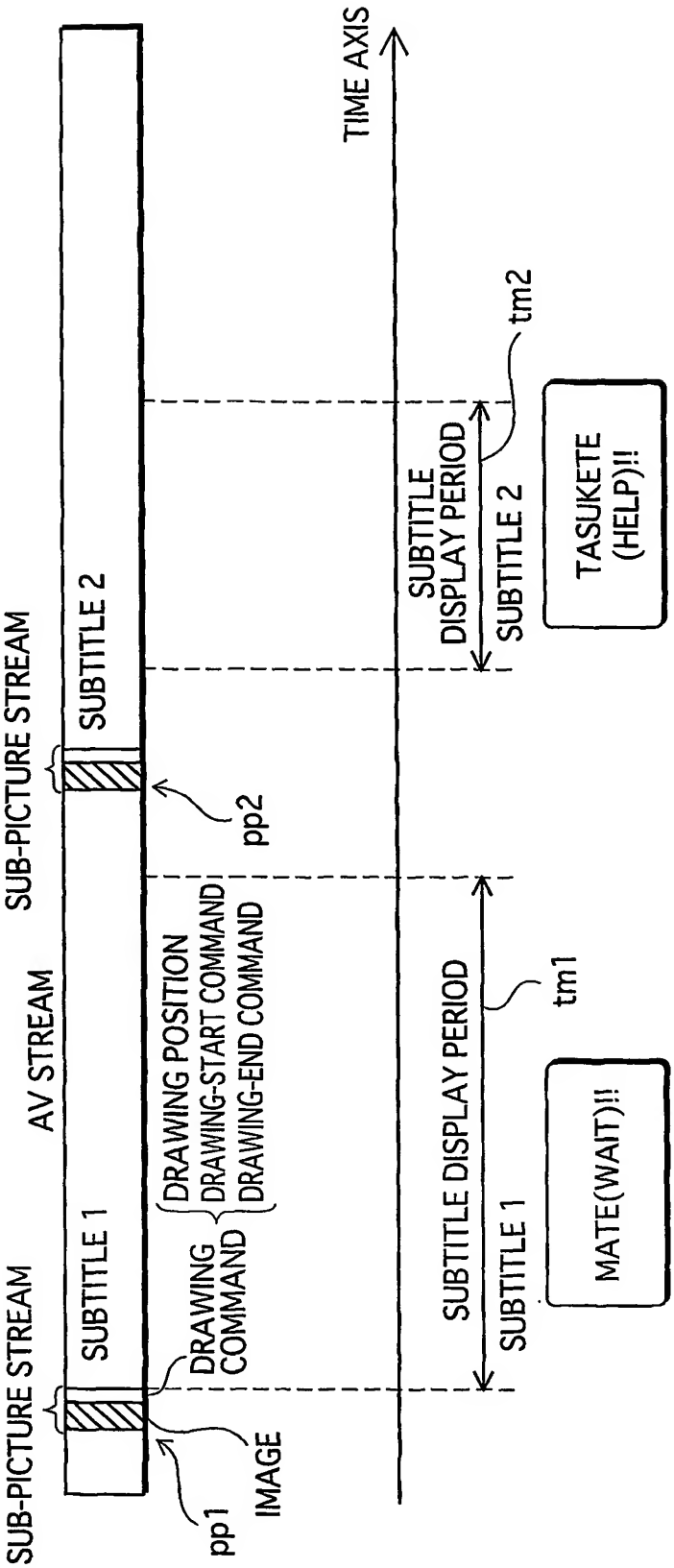

TIME AXIS
SUB-PICTURE STREAM
SUBTITLE 2
AV STREAM
SUB-PICTURE STREAM
SUBTITLE 1
DRAWING COMMAND
DRAWING POSITION
DRAWING-START COMMAND
DRAWING-END COMMAND
IMAGE
pp1
pp2
SUBTITLE DISPLAY PERIOD
SUBTITLE 1
tm1
MATE(WAIT)!!
SUBTITLE DISPLAY PERIOD
SUBTITLE 2
tm2
TASUKETE (HELP)!!

FIG.30

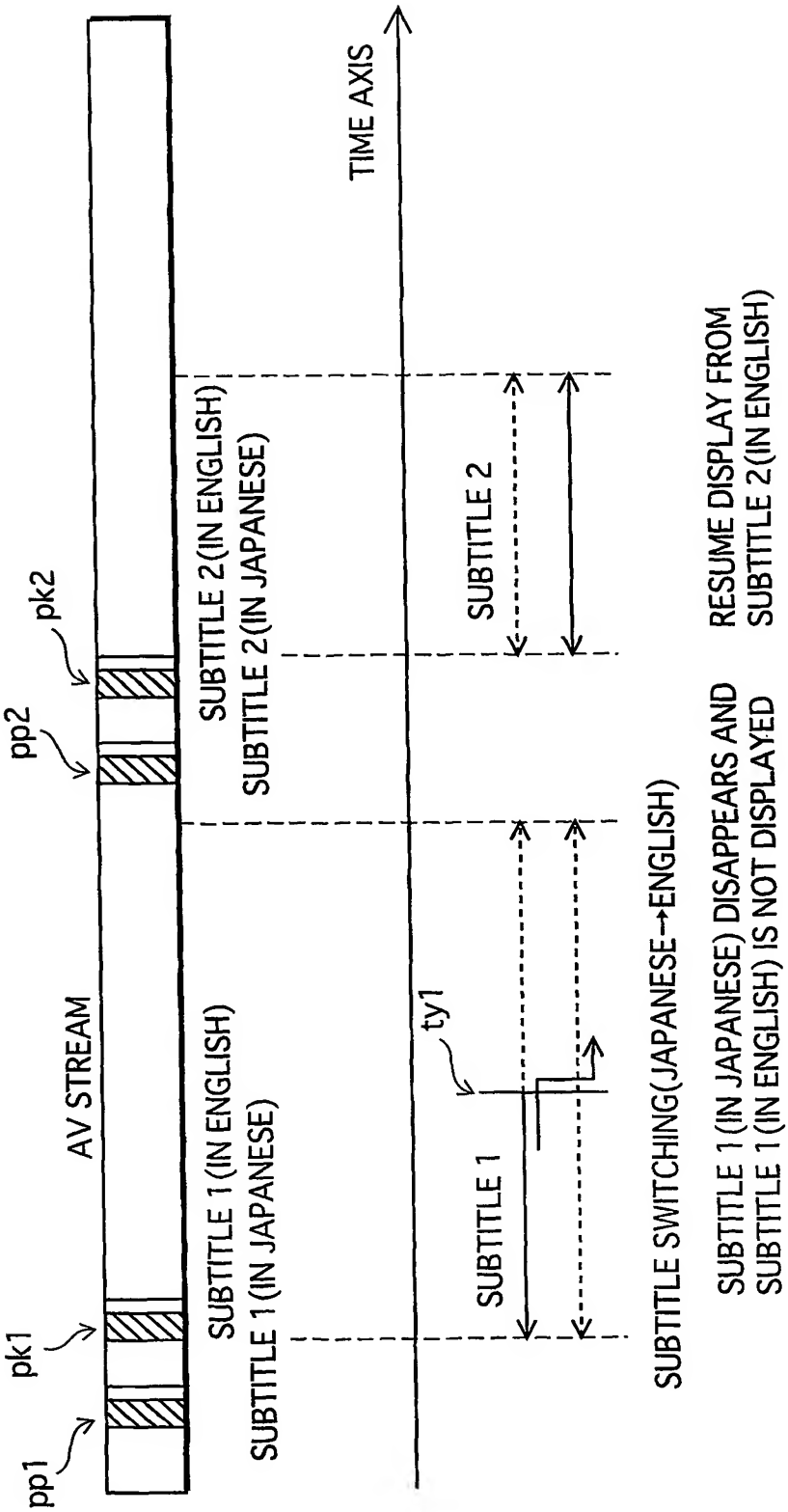

TIME AXIS
AV STREAM
pp1
pk1
pp2
pk2
SUBTITLE 1 (IN ENGLISH)
SUBTITLE 1 (IN JAPANESE)
SUBTITLE 2(IN ENGLISH)
SUBTITLE 2(IN JAPANESE)
ty1
SUBTITLE 1
SUBTITLE 2
SUBTITLE SWITCHING(JAPANESE→ENGLISH)
SUBTITLE 1(IN JAPANESE) DISAPPEARS AND
SUBTITLE 1(IN ENGLISH) IS NOT DISPLAYED
RESUME DISPLAY FROM
SUBTITLE 2(IN ENGLISH)

FIG.31

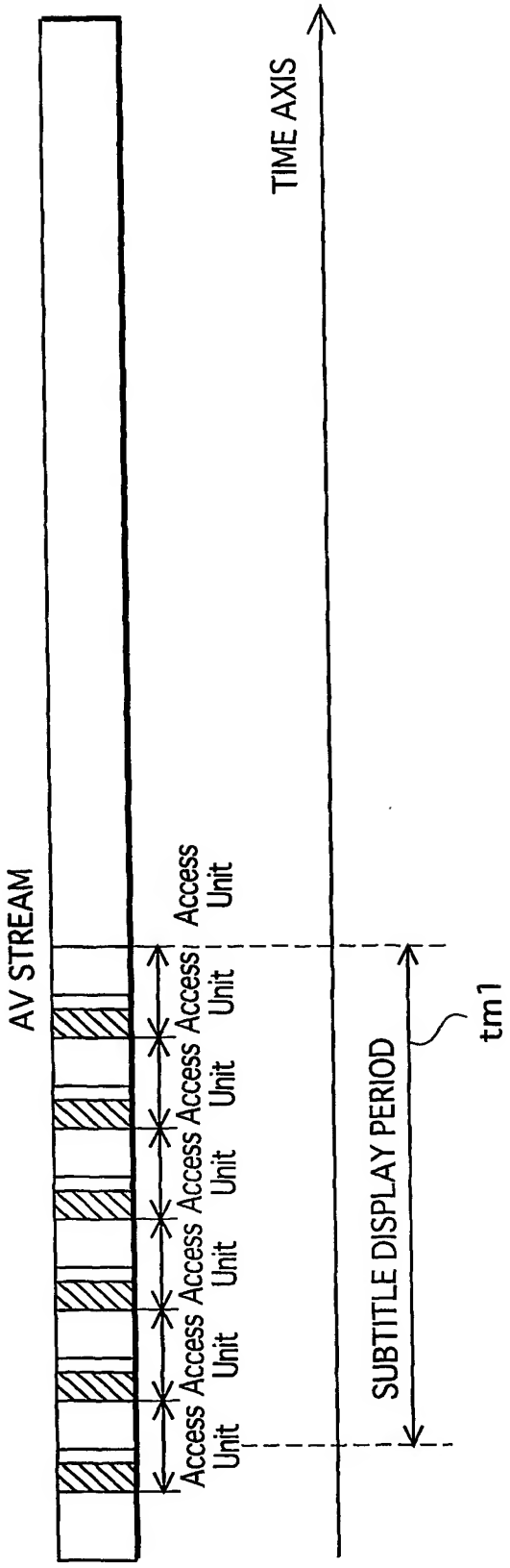
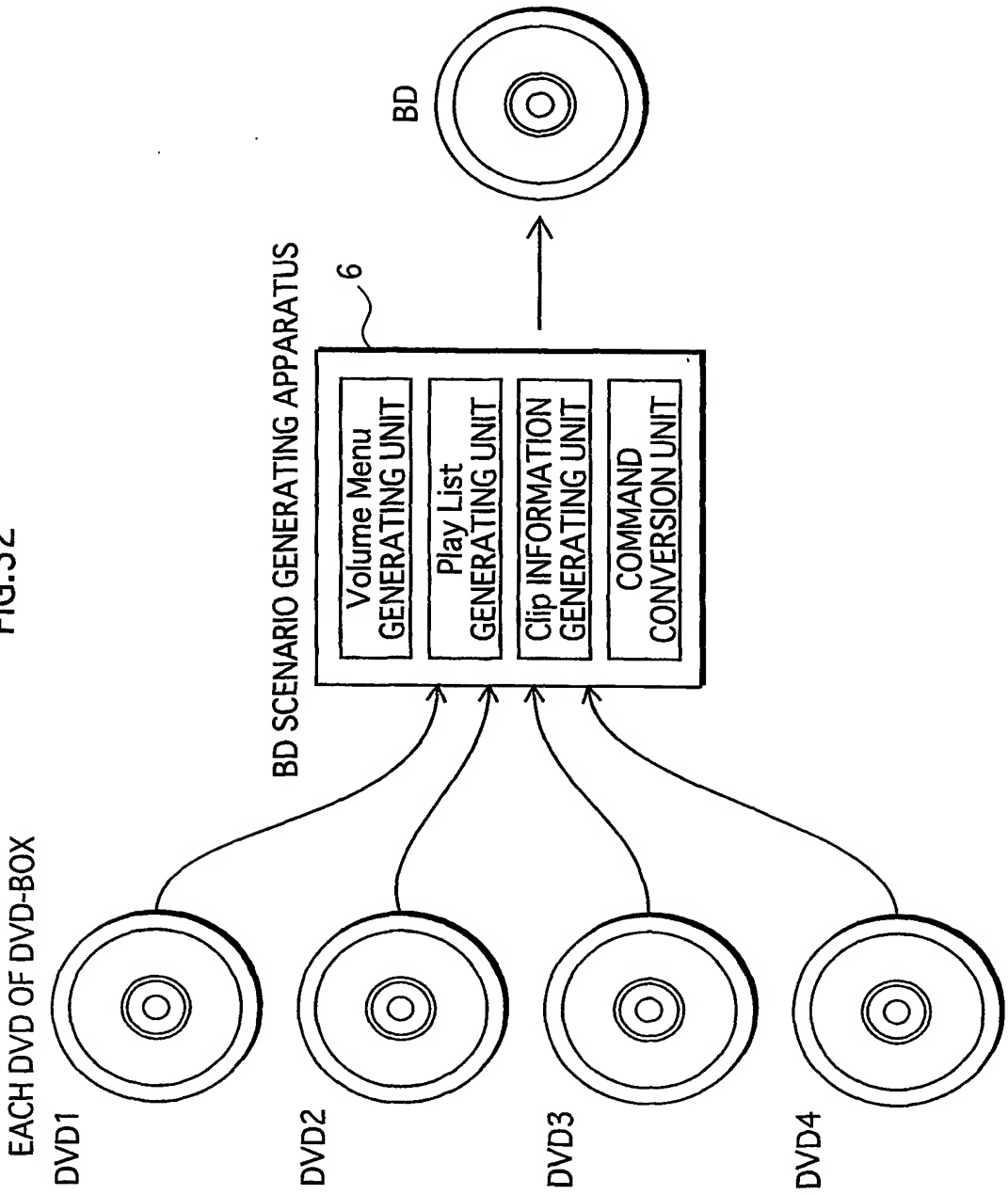

AV STREAM
TIME AXIS
Access Unit
Access Unit
Access Unit
Access Unit
Access Unit
Access Unit
SUBTITLE DISPLAY PERIOD
tm1

FIG.32


EACH DVD OF DVD-BOX
DVD1
DVD2
DVD3
DVD4
BD SCENARIO GENERATING APPARATUS
6
Volume Menu GENERATING UNIT
Play List GENERATING UNIT
Clip INFORMATION GENERATING UNIT
COMMAND CONVERSION UNIT
BD

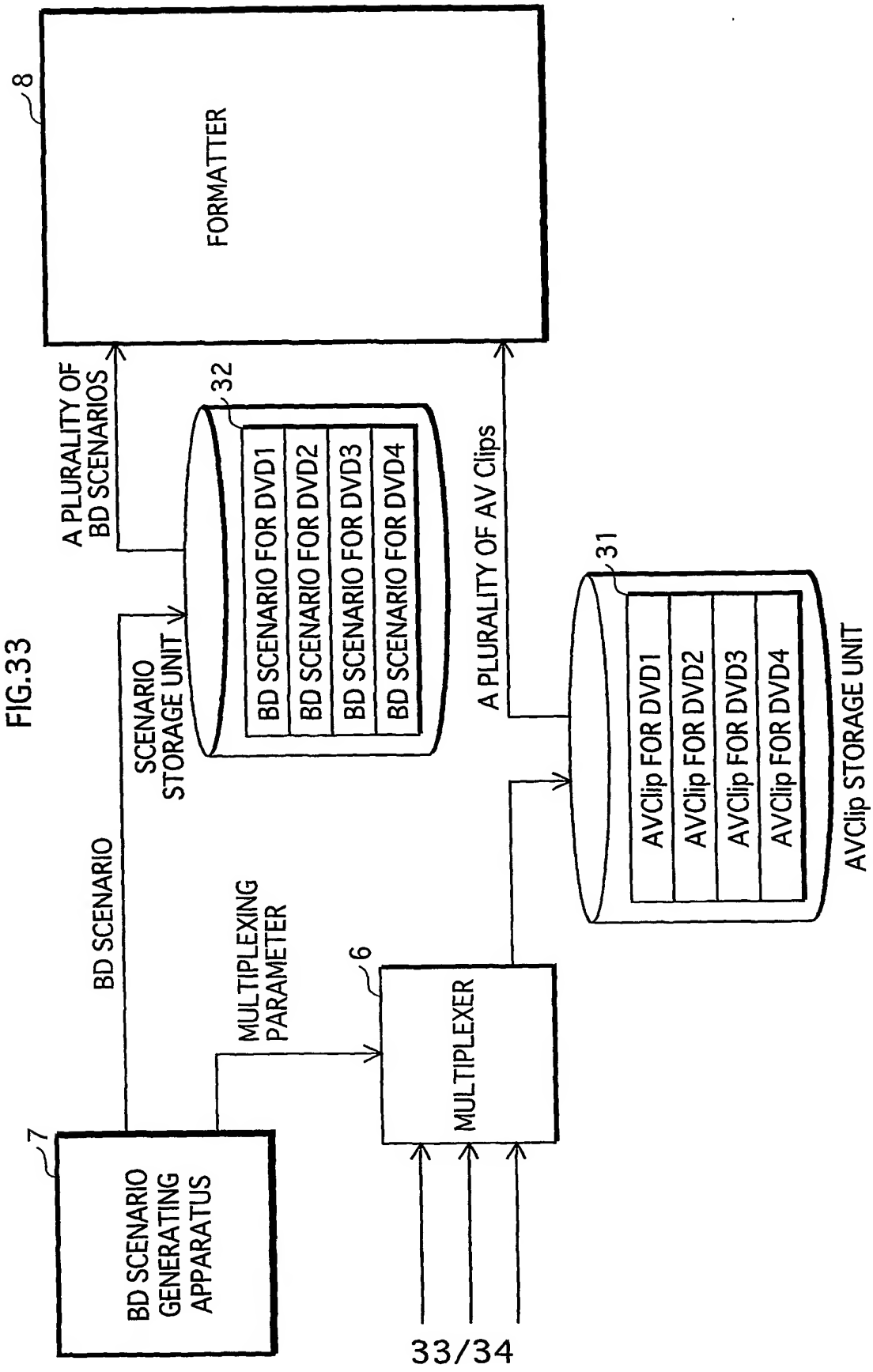
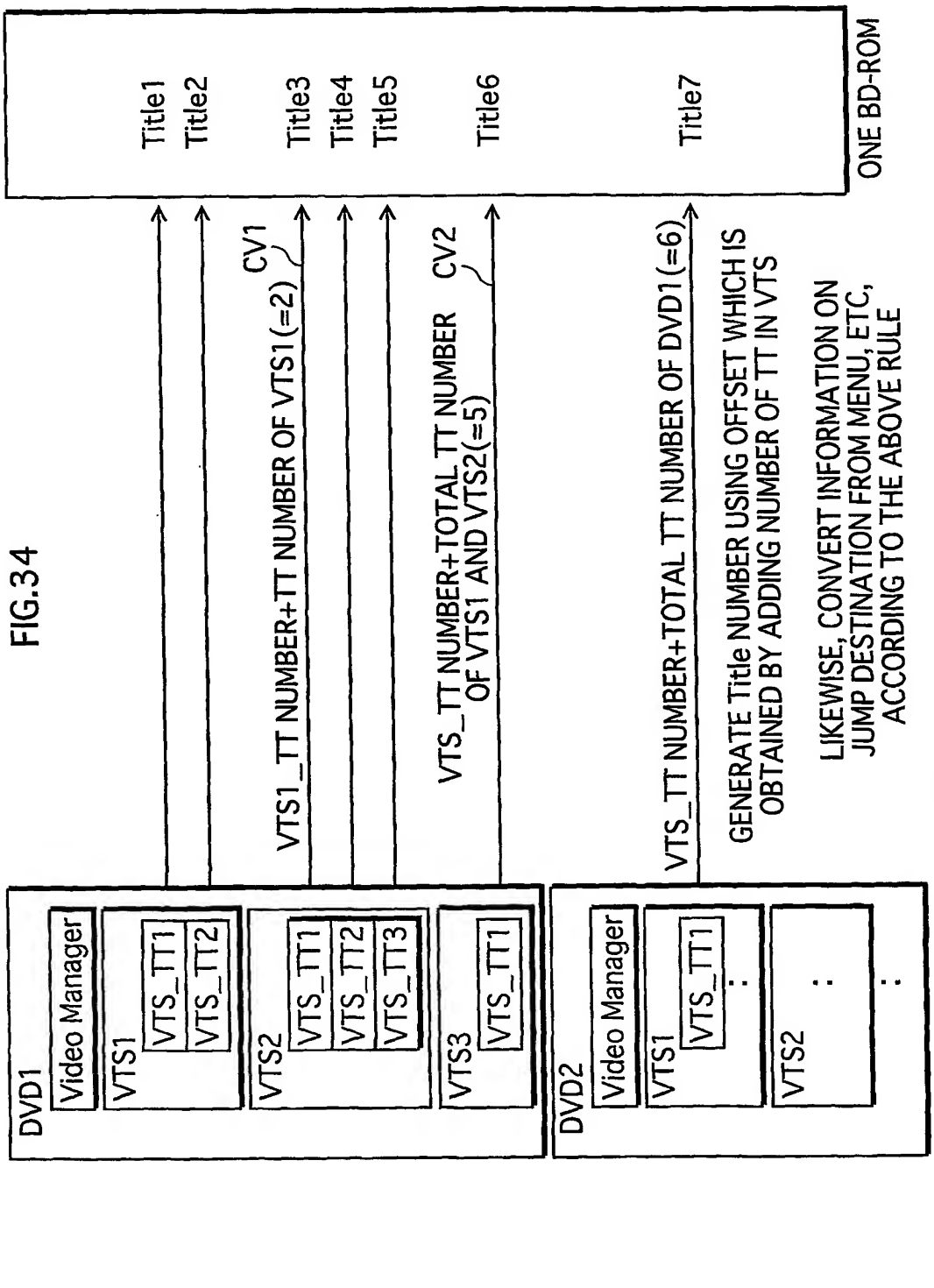

8
FORMATTER
A PLURALITY OF BD SCENARIOS
32
BD SCENARIO FOR DVD1
BD SCENARIO FOR DVD2
BD SCENARIO FOR DVD3
BD SCENARIO FOR DVD4
SCENARIO STORAGE UNIT
A PLURALITY OF AV Clips
31
AVClip FOR DVD1
AVClip FOR DVD2
AVClip FOR DVD3
AVClip FOR DVD4
AVClip STORAGE UNIT
BD SCENARIO
MULTIPLEXING PARAMETER
6
MULTIPLEXER
7
BD SCENARIO GENERATING APPARATUS

FIG.33

FIG.34


DVD1
Video Manager
VTS1
VTS_TT1
VTS_TT2
VTS2
VTS_TT1
VTS_TT2
VTS_TT3
VTS3
VTS_TT1
DVD2
Video Manager
VTS1
VTS_TT1
VTS2
Title1
Title2
Title3
Title4
Title5
Title6
Title7
ONE BD-ROM
CV1
VTS1_TT NUMBER+TT NUMBER OF VTS1(=2)
CV2
VTS_TT NUMBER+TOTAL TT NUMBER OF VTS1 AND VTS2(=5)
VTS_TT NUMBER+TOTAL TT NUMBER OF DVD1(=6)
GENERATE Title NUMBER USING OFFSET WHICH IS OBTAINED BY ADDING NUMBER OF TT IN VTS
LIKEWISE, CONVERT INFORMATION ON JUMP DESTINATION FROM MENU, ETC, ACCORDING TO THE ABOVE RULE
EACH DVD-Video BELONGING TO DVD-BOX